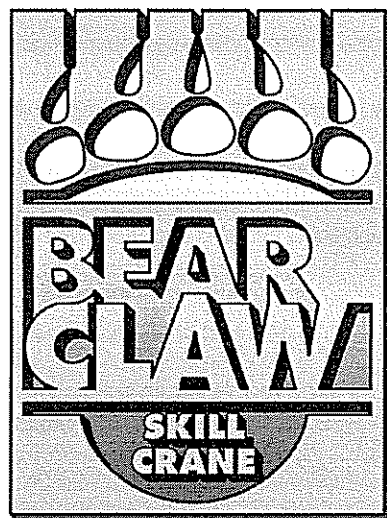
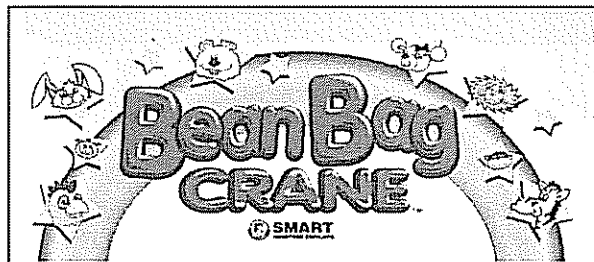
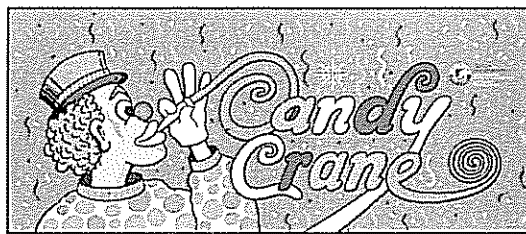




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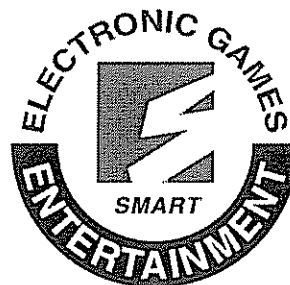
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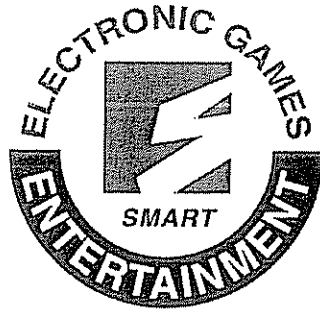
MANUAL

SMART

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or write to:

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Technical Service Department
1626 Delaware Avenue
Des Moines, Iowa 50317-2938

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Candy Crane Black 7th Generation Manual
Candy Crane Red 7th Generation Manual
Candy Crane Oak 7th Generation Manual
Candy Crane Black Bean Bag 7th Generation Manual
Candy Crane Red Bean Bag 7th Generation Manual
Bear Claw/Clean Sweep 26" 7th Generation Manual
Prize Time 30" Candy Crane/Prize Time 30" 7th Generation Manual
Bear Claw/Clean Sweep/Prize Time 34" 7th Generation Manual
Bear Claw/Clean Sweep/Prize Time 42" 7th Generation Manual
Bear Claw/Clean Sweep/Prize Time 60" Single 7th Generation Manual
Bear Claw/Clean Sweep/Prize Time 60" Double 7th Generation Manual

Part Number 14294 Rev B

Revision Date for this manual is July, 2001

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SECTION ONE:

GAME SETUP AND INSTALLATION

WARNING: SHOCK HAZARD

Connect this machine only to a grounded 3 wire outlet. If you have only a 2 wire outlet, we recommend that you hire a licensed electrician to install a grounded outlet. Players may receive an electric shock if this machine is not properly grounded! This game is designed for indoor use only.

GAME INSPECTION

Your careful inspection is needed to supply the final touch of quality control. Please follow these steps to help us insure that your new game was delivered to you in good condition.

NOTE: Do not plug machine in yet.

1. Examine the exterior of the machine cabinet for dents, chips, or broken parts
2. Unlock and open the front access door, then inspect the interior of the game as follows.

Check that all plug-in connector (on the machine harness) are firmly seated. Re-plug any connector found unplugged. Don't force connectors together. The connectors are keyed so they only go on in the proper orientation. A reversed edge connector will damage a PCB and will void your warranty. Extend power cord from the back of the cabinet. Check the cord for any cuts or dents in the insulation.

3. Remove all wire ties installed to restrain the crane head from movement during shipping.
Perform a thorough visual inspection of the crane head assembly for any signs of damage.

INSTALLATION

Foreign	200 to 240 VAC @ 50 Hz (Adapter Plug and Light Ballast Option OR Additional Transformer Required)
Domestic	110 VAC @ 60 Hz
Temperature:	32 degrees to 100 degrees F (0 degrees to 38 degrees C)
Humidity:	Not over 95% relative

REGULATIONS - YOUR RESPONSIBILITY

Your machine has been carefully designed and manufactured. Our factory is capable of designing unique features or controls should your jurisdiction's regulations require it. The set-up and the daily operation of your machine greatly influence the legal acceptance of your on-location crane business.

Your responsibilities include:

1. Not altering or tampering with any factory settings, circuitry or programs without factory authorization. Doing so will nullify and void your warranty and may be criminal.
2. Ascertaining that each and every prize you place in the game's play field can be retrieved and won by a player. (Consider that some prizes can be too small, large or heavy).
3. Checking the machine frequently to insure that the prizes are not packed, restricted, or inaccessible to a player. If a prize cannot be retrieved by a skillful player in a reasonable number of attempts, DO NOT place it within the game.
4. Checking with the jurisdiction authorities where you are operating as to any required business license, games license or regulations. (You may also do this through your business legal advisor).
5. Inspecting your machine daily to ascertain that all mechanisms are properly functioning, that all decals and signs are posted, and that your prizes are well stocked. This will increase your play.
6. Your fair consideration with the customers is your best long-term repeat business.

GAME COMPONENT LOCATIONS

Component Board--*Bear Claw, Clean Sweep, and Prize Time*

The component board of the machine can be found by opening the front access door of the machine. The component board is mounted on rails to allow the component board to be pulled part way out (without the need to remove any harnesses from their P-clip mounts) to access game controls and adjustments. The component board may be removed entirely from the game (once harnesses are unclipped from their P-clip mounts and detached from the circuit board connectors) to allow better access for examination, troubleshooting, or replacement of the entire component board. Prior to any movement of the component board, the small metal bracket or any wire ties holding the board in place must be removed. Reinstall the bracket or wire ties when the board is returned to its proper position.

Component Board--*Bean Bag Crane and Candy Crane*

The component board of the machine can be found by opening the back or front access doors of the game. The component board is mounted to the side of the cabinet with particle board screws. The component board may be removed entirely from the game (once harnesses are unclipped from their P-clip mounts and detached from the circuit board connectors) to allow better access for examination, troubleshooting, or replacement of the entire component board.

Power Switch

The main "POWER" switch is located on the front of the component board, inside of the access door opening. On *Bean Bag Crane* and *Candy Crane* machines, the "POWER" switch can also be accessed through the upper coin mechanism door. Every time the machine is switched on, several tests are performed. First, the software version is displayed on the credit/timer display. Then, the display will show "00" on both the credit display and the timer display. At the same time that the credit/timer display begins showing "0" on each digit, the crane head motors will attempt to raise the magnetic claw (if not fully raised) and attempt to take the crane head to the "home" position over the prize box opening (if not already in that position). At the same time the credit/timer display goes to "00," the crane head attempts to raise the magnetic claw (if it is not fully raised) and attempts to take the crane head assembly to the home position over the prize box (if it is not already in this location). The credit/timer display will show "0" on each digit until either the crane head either homes or the homing period times out. Once the crane head is either in the home position or the homing period times out, the CREDIT display will show "00" and the TIMER display will show the full time available for each game. If the game does not power up properly, see the manual section titled "Troubleshooting".

Light Switch

The "LIGHTS" switch is located on the front of the component board inside of the front access door. On *Bean Bag Crane* and *Candy Crane* machines, the "LIGHTS" switch can also be accessed through the upper coin mechanism door. The "LIGHTS" switch turns on the overhead play field lights. This allows the lights to be turned on independently of the rest of the game.

NOTE: The machine includes a Safety Interlock Switch that removes power from the machine whenever the front access door is opened. This Switch is a necessary safety feature, designed to prevent accidental contact with dangerous voltages within the machine. Regardless of the state of the "POWER" and "LIGHTS" switches, power will not be provided to the machine until either the Interlock Switch is overridden (by pulling outward on the actuator of the Interlock Switch) or the front access door is again closed.

GAME COMPONENT LOCATIONS - (continued)

Fuses

WARNING: AN OPEN FUSE USUALLY INDICATES A PROBLEM. Before replacing the fuse, try to eliminate any possible problems. NEVER BYPASS A FUSE. Each fuse is in place for a specific reason. Bypassing a fuse can result in fire or damage to the electronics. ALWAYS REPLACE A FUSE WITH A FUSE HAVING THE SAME VOLTAGE, CURRENT, AND TIME DELAY RATINGS.

Main Power Fuse

The main fuse (6-ampere fast blow) is located next to the "POWER" switch on the front right of the component board (On *Bean Bag Crane* and *Candy Crane* machines, this fuse is located below the "LIGHTS" switch on the lower right of the front of the component board) This fuse protects the entire game. Problems with electronics, lighting, or wiring can cause this fuse to open.

Secondary Fuses

Three other fuses are located on the front of the component board.

A 7-ampere slow blow fuse protects the 25 VAC winding of the main transformer. This winding provides power to the crane motors and claw coil and their respective drive circuitry on the BP2000 controller board.

A 4-ampere slow blow fuse protects one of the two 12 VAC windings of the main transformer. This winding provides power for the rope lights and their respective driver circuits on the BP2000 controller board.

Note: Only *Clean Sweep* and *Prize Time* machines may include rope lights

A 3-ampere slow blow fuse protects the other 12 VAC winding of the main transformer. This winding provides power for all 12 volt and 5 volt DC devices within the game and on the BP2000 controller board.

DIP Switches

Game setting adjustments may be made with three banks of DIP switches, labeled "S2", "S3", and "S5", on the BP2000 controller board. These switches are located along the edge of the BP2000 controller board next to connector JP2. Please refer to Section 2, "Game Adjustments," for more information regarding DIP switch settings. THE GAME MUST BE RESET AFTER MAKING ANY DIP SWITCH GAME SETTING CHANGES.

Reset Button

To reset the game, press and release the "Reset" button once.

The "Reset" button (S4) is located next to the square IC socket near the center of the BP2000 controller board.

Power Cycling to Reset the Game

The game can also be reset by cycling the main power switch. To cycle power, turn off the main "POWER" switch and allow the game to sit unpowered for at least 5 seconds (or until LED LD18 is no longer illuminated), and then return power to the game by turning the main "POWER" switch back on.

GAME COMPONENT LOCATIONS - (continued)

Volume Control

The sound volume can be controlled with the volume control potentiometer. The volume control potentiometer (R4, labeled "Volume") is located about halfway between the square IC socket and the DIP switches on the BP2000 controller board. Turning the volume control potentiometer knob clockwise or counter clockwise will increase or decrease, respectively, the volume of the sound from the game speaker.

Claw Strength Control

With the exception of games manufactured for sale in the state of California, a potentiometer on the BP2000 controller board is used to control the strength of the magnetic claw. This potentiometer (R38, labeled "Claw Strength") is located about 1 inch from connector JP1 along the edge of the BP2000 controller board. See the section in the manual titled "Game Adjustments" for detailed information on adjusting the magnetic claw strength.

Audit/Test Button

To enter the game software settings, audits, and tests, press and release the "Audit/Test" button. The game software settings allow more detailed game adjustment than the simple on/off control provided by the DIP switches. The "Audit/Test" button (S1) is located next to the rectangular IC socket along one edge of the BP2000 controller board. See the section of the manual titled "Game Adjustments" for detailed information on the game software settings, audits, and tests.

EPROMs

All EPROMs are located on the BP2000 controller board and mounted on the component board assembly. All EPROM's are socket mount ICs, allowing easy removal and installation for program revisions and user-specific software. The main game controller EPROM is located at U1 in the square IC socket. Game sound information is stored on the EPROM in the rectangular IC socket U7.
WARNING: ALWAYS INSURE THAT CORRECT ORIENTATION OF THE EPROM IS OBSERVED WHEN REPLACING ANY EPROM.

<u>Main</u>	EPROM U1
<u>Sound</u>	EPROM U7

Coin Meter and Prize Meter

The coin meter and prize meter are mounted on the front of the component board. A label above each meter describes what the meter measures.

GAME COMPONENT LOCATIONS - (continued)

Prize Detector Assembly

(Standard on *Clean Sweep* machines, Optional on *Bear Claw* and *Prize Time* machines)

The Prize Detector assemblies are located on each side of the prize box opening below the play field. Alignment of each Prize Detector assembly with the other is very important to maintaining an accurate counting of prizes won. Refer to the sections *Game Adjustments*, *Theory of Operation*, and *Troubleshooting* in this manual for more information on alignment and operation of the Prize Detector assembly units.

Prize Detector for *Bean Bag Crane* and *Candy Crane*

The Prize Detector (a photo eye) is located on the side of the prize box. Alignment of the reflective tape on the side of the prize box opposite the photo-eye is very important in maintaining accurate detection or countings of prizes won. Refer to the sections *Game Adjustments*, *Theory of Operation*, and *Troubleshooting* in this manual for more information on alignment of the reflective tape and operation of the Prize Detector.

GLASS SPECIFICATIONS

All glass is 1/4 inch thick, tempered Call **Smart Industries** for pricing.

WARNING: DO NOT REPLACE GLASS WITH ANY OTHER THAN TEMPERED GLASS.

CLEAN SWEEP.

<u>Doors</u>	26"	22 1/4" x 49 1/4"
	34"	30 1/4" x 49 1/4"
	42"	37 3/4" x 49 1/4"
	60"	28 1/4" x 36 1/4"
<u>Side Glass</u>	All	29" x 49 1/2"
<u>Back Mirror</u>	26"	23 1/4" x 38 1/2"
	34"	31 1/4" x 38 1/2"
	42"	38 3/4" x 38 1/2"
	60"	56 3/4" x 38 1/2"

BEAR CLAW.

<u>Doors</u>	26"	21 7/8" x 32 3/8"
	34"	29 7/8" x 32 3/8"
	42"	37 7/8" x 32 3/8"
	60"	34 3/4" x 28 1/4" (Each, left and right)
<u>Side Glass</u>	All	19 1/2" x 38"
<u>Back Mirror</u>	26"	23 1/4" x 38 1/2"
	34"	31 1/4" x 38 1/2"
	42"	38 3/4" x 38 1/2"
	60"	56 5/8" x 38 1/2"

PRIZE TIME.

<u>Doors</u>	30"	24 7/16" x 29 3/4"
	34"	28 7/16" x 29 3/4"
	42"	36 7/16" x 29 3/4"
	60"	28 13/16" x 27 1/8" (Each, left and right)
<u>Side Glass</u>	All	19 1/2" x 38"
<u>Back Mirror</u>	30"	26 1/2" x 38 1/2"
	34"	31 1/4" x 38 1/2"
	42"	38 3/4" x 38 1/2"
	60"	56 5/8" x 38 1/2"

GLASS SPECIFICATIONS (continued)

BEAN BAG CRANE and CANDY CRANE:

<u>Doors</u>	22-5/16 x 27
<u>Back Mirror</u>	27-7/16 x 31

Serial Numbers / UL Label / CSA Label

The Serial Number is important in issues of game version, game configuration, warranty service, and repairs. The **UL** Label certifies this specific product or game has been listed with **Underwriters Laboratory**. The **CSA** Label certifies this specific product or game has been listed with **Canadian Standards Association**.

Boards. All board serial numbers are located on the specific boards themselves, and are indicated by a white printed serial number label.

Game: The game serial number, **UL** Label (if given), **CSA** Label (if given), and power ratings are located on the back of the game.
Removing this important label will void the manufacturer's warranty.

Options

Marquee Light Display

Marquee lights displays are available for the BC & CS 34", BC & CS 42", both versions of the BC & CS 60" Cranes, and the Candy Crane. The marquees have separate AC adapters and controllers, and operate independently of the game itself.

NOTE: When another adapter plug is used instead of the 120 VAC adapter plug, a step down 120 VAC transformer must be installed to drive the marquee light display.

Push Button Game Control

In lieu of a joystick, all configurations of the *Bear Claw*, *Clean Sweep*, and *Prize Time* Cranes can be set up to operate as a two-button push button game.

Bulk Vendor/Gum Ball Dispenser (not available with Card Dispenser option)

A bulk vendor or gum ball dispenser option is available for the all configurations of the *Clean Sweep* Crane. A bulk vendor or gum ball dispenser allows dispensing of perceived-value items at the start of each game for jurisdictions requiring such a dispense.

NOTE: When another adapter plug is used instead of the 120 VAC adapter plug, a step down 120 VAC transformer must be installed to drive the bulk vendor/gum ball dispenser motor.

Card Dispenser (not available with Bulk Vendor/Gum Ball Dispenser option)

A card dispenser is available for the all configurations of the *Bear Claw* and *Clean Sweep* Cranes. A card dispenser allows dispensing of a perceived-value item (in this case, a collectable card) at the start of each game for jurisdictions requiring such a dispense.

Adapter Plug

The standard adapter plug (P/N 13002) is used for 120 VAC input to the game. For other voltage inputs, adapter plugs are available. This allows the crane to run in an area not supplied with 120 VAC power. The adapter plug is mounted inside the access door, on the component board, behind the main transformer.

<u>P/N</u>	<u>Voltage</u>	<u>Wire Color</u>
13002	120 VAC	Yellow
13045	220 VAC	Blue
13046	110 VAC	Red
13047	200 VAC	Black
13048	240 VAC	Brown

NOTE: When another adapter plug is used instead of the 120 VAC adapter plug, the fluorescent ballasts and dollar bill acceptor (if supplied) must be replaced with matching voltage.

Watch Crane

This option allows the crane to be converted to a watch crane for merchandising jewelry-type items.

Large Claw Assembly

This option allows the crane to pick up larger merchandise.

SECTION TWO:

GAME ADJUSTMENTS

BP2000

DIP Switch Settings

S2 Controls

Switch Bank S2	1	2	3	4	5	6	7	8
<u>GAME MODEL</u>								
CS/BC 26" - PT 30"	Off	Off	Off					
CS/BC/PT 42"	On	Off	Off					
CS/BC/PT 34"	Off	On	Off					
CS/BC/PT 60" Prize Box on Left Side	On	On	Off					
CS/BC/PT 60" Prize Box on Right Side	Off	Off	On					
PT 30" Candy - Candy/Bean Bag	On	Off	On					
Unused	Off	On	On					
CS/BC/PT 60" Single	On	On	On					
<u>GAME PLAY SELECTION</u>								
B + Game				<u>Off</u>	<u>Off</u>			
B Game				On	Off			
C Game				Off	On			
A + B Game				On	On			
<u>B, B+, and C CENTERING/A+B BOUNCE</u>								
Centering / A + B Bounce	NO					Off		
Desired?	<u>YES</u>					<u>On</u>		
Attract Sound Desired?	NO						Off	
	<u>YES</u>						<u>On</u>	
Play Till You Win	<u>NO</u>							<u>Off</u>
Desired?*	YES							On

*For Candy Crane and PT30" Candy Crane, "Play Til You Win" is Factory Set to ON.

BP2000 DIP Switch Settings - (continued)

S3 Controls

Switch Bank S3	1	2	3	4	5	6	7	8
Card Dispenser Installed? <u>NO</u> YES	<u>Off</u> On							
Close Claw Button Installed? <u>NO</u> YES		<u>Off</u> On						
Coins per Play 1 Coin* 2 Coins 4 Coins Free Play			Off <u>On</u> Off On	Off <u>Off</u> On On				
Coin Inputs Given Per DBA Pulse ** 4 Inputs Per Pulse 3 Inputs Per Pulse 2 Inputs Per Pulse 1 Input Per Pulse					Off <u>On</u> Off On	Off <u>Off</u> On On		
BURN IN*** GAME TIMER*** (Seconds) (Seconds) 7 20 17 25 27 30 37 35							Off <u>On</u> Off On	Off <u>Off</u> On On

*Candy Crane is set for one coin per play

**DBA is Factory Set at one pulse per dollar

*** If Position 8 of DIP Switch S5 is set to ON, Positions 7 and 8 of DIP Switch S3 will control the amount of time between "Burn-In" cycles.

If Position 8 of DIP Switch S5 is set to OFF, Positions 7 and 8 of DIP Switch S3 will control the maximum amount of time that a player will have to position the crane head before the claw assembly is automatically dropped.

BP2000 DIP Switch Settings - (continued)

S5 Controls

Switch Bank S5		1	2	3	4	5	6	7	8
Bonus Credits Given?	<u>NO</u> YES	<u>Off</u> On							
Dual-Value Coin Mechanism Installed?	<u>NO</u> YES		<u>Off</u> On						
Unused				<u>Off</u> On					
Attract Mode Desired?*	NO <u>YES</u>				<u>Off</u> On				
Unused						<u>Off</u> On			
2 Channel Rope Light 3 Channel Rope Light							<u>Off</u> On		
Prize Detection Installed?	NO YES							<u>Off</u> On	
Burn-In Mode Desired?**	<u>NO</u> YES								<u>Off</u> On

*For *Bean Bag Crane* and *Candy Crane*, factory setting for "Attract Mode" is OFF.

**If Position 8 of DIP Switch S5 is set to ON, Positions 7 and 8 of DIP Switch S3 will control the amount of time between Burn-In cycles.

GAME CONFIGURATION DESCRIPTIONS

Adjustment

The game configuration is set by the *Game Play Selection* switches, Switches 4 and 5 of DIP Switch S2 on the BP2000 controller board.

A+B GAME This game setting may be used with either joystick or push button control. The CENTERING option is not available with this configuration (see notes below). In this configuration, the crane head and magnetic claw may be moved *Forward* to the desired position. When movement *Forward* is stopped, movement in that particular direction is locked. The crane head and magnetic claw may then be moved to the *Right*. When movement to the *Right* is stopped, the magnetic claw will automatically drop. Likewise, *Right* motion may be initiated first, followed only by *Forward* movement. (See NOTE 1 and NOTE 3 below)

B GAME (Also known as the "Dragger" or "Nudge" game.) In this configuration, the joystick gives full selection of position on the playing field. Operation of the red joystick button permits dropping of the magnetic claw in small increments. Re-aiming of the magnetic claw is permitted after dropping is initiated. (See NOTE 2 and NOTE 3 below)

B+ GAME In this configuration, the joystick gives full selection of position on the playing field. Operation of the red joystick button initiates automatic dropping of the magnetic claw. Dropping of the magnetic claw in small increments is not permitted and re-aiming of the magnetic claw is not permitted after dropping is initiated. (See NOTE 2 and NOTE 3 below)

C GAME In this configuration, the joystick gives full selection of position on the playing field. Operation of the red joystick button permits dropping of the magnetic claw in small increments. This configuration is similar to the B GAME, except that re-aiming of the magnetic claw is not permitted after dropping of the claw is initiated. (See NOTE 2 and NOTE 3 below)

NOTE 1: In A+B configurations, if the BOUNCE option is selected, the crane head will reverse direction when a limit of travel is reached. The crane head will continue moving until the button or joystick is released, or until game play time expires.

NOTE 2: In B, B+, or C configurations, if the CENTERING option is selected, the crane head and magnetic claw will automatically be positioned in the CENTER of the playing field when any play credits are detected. Play cannot commence until this movement has occurred.

NOTE 3: In all game configurations, when downward motion of the magnetic claw is impeded by a prize or by reaching the limit of its travel, the magnetic claw is energized and return of the magnetic claw and crane head to the "home" position over the prize box is automatic; after returning "home," the magnetic claw will de-energize and drop any prize retrieved into the prize box.

DIP SWITCH SETTINGS

LOCATION

Three banks of eight two-position DIP switches are located on the controller board. The switches are marked S2, S3, and S5. These switches are located along the edge of the BP2000 controller board, next to connector JP2. The ON position of the switches is marked with an arrow on the switch.

Descriptions of the settings follow. See the *BP2000 DIP Switch Setting* table for settings. Other game settings are available through software settings by pressing and releasing the "Audit/Test" button. See the *Software Settings Mode* section of this manual for details.

DIP SWITCH SETTINGS DESCRIPTIONS

S2 CONTROLS

Game Model - S2 Positions 1, 2, and 3

These three switches define the size and type of machine in which the BP2000 controller board is being used. These switches should be factory set for the machine type, and should only be adjusted if a new controller board is installed.

Game Play Selection - S2 Positions 4 and 5

These two switches determine the style of play for the game. Refer to the *Game Configuration Descriptions* in this section of the manual for a detailed explanation of game operation for each *Game Play Selection* choice

Factory setting is B+ game play.

B, B+, and C Centering / A+B Bounce - S2 Position 6

If this switch is ON and B, B+, or C game play has been chosen by the *Game Play Selection* switches, the crane head assembly will move towards the center of the play field at the start of every new game. If this switch is OFF, B, B+, and C type games will always begin with the crane head in the "home" position over the prize box.

If this switch is ON for A+B type game play, the crane head will reverse direction when a limit of travel is reached. The crane head will continue moving and reversing direction at play travel limits until the player stops movement in that direction or game play time expires. If this switch is OFF, crane head movement will be stopped once the crane head reaches a limit of travel, and movement in that direction will no longer be allowed during that play period.

NOTE: All A+B games will begin with the crane head in the "home" position over the prize box.

Factory Setting is Centering ON.

Attract Sound Desired? - S2 Position 7

With this switch in the ON position, the game will play a short tune or attract voice statements at intervals determined by the BP2000 controller software.

Factory setting is Attract Sound ON.

Play Till You Win Desired?- S2 Position 8

With this switch in the ON position, the player is allowed to play series of games based on each Game Play credit until a prize is won. There is no limit on the number of play attempts needed to win a prize. This feature requires the presence of a prize detection system to operate properly.

[NOTE: For software releases dated after June of 2001, the presense of a prize detection system will AUTOMATICALLY be assumed if the "Play Till You Win Desired?" Switch (DIP Switch S2-Position 8) is placed in the ON position. If the "Play Till You Win Switch Desired?" is placed in the ON position, the "Prize Detection Installed?" Switch (DIP Switch S5-Position 7) will have NO effect on game operation.]

Factory setting is OFF for *Clean Sweep*, *Bear Claw*, *Prize Time* and *Bean Bag Crane*.

Factory setting is ON for *Candy Crane* and *PT 30" Candy Crane*.

DIP SWITCH SETTINGS DESCRIPTIONS (continued)

S3 CONTROLS

Card Dispenser Installed? - S3 Position 1

This switch should only be in the ON position if a card dispenser or bulk vendor has been installed in the machine. With this switch in the ON position, "d.d." in the Software Settings section of the "Audit/Test" mode will control the number of dispenses that occur for each Game Play credit purchased. [NOTE: For software releases dated after June of 2001, option "d.d." in the "Audit/Test" mode will NOT be displayed UNLESS DIP Switch S3-Position 1 is placed in the ON position.]

Factory setting is OFF (no card dispenser or bulk vendor installed).

Close Claw Button Installed? - S3 Position 2

This switch should only be in the ON position if a manual "Close Claw" button (required by some jurisdictions) has been installed in the machine. If this switch is in the ON position, the claw will not automatically energize and rise when the claw reaches its "down limit" position. The "Close Claw" button must be pressed by the player to cause the claw to energize, close, and rise again. The claw will only automatically rise if game play time has expired.

Factory setting is OFF (no "Close Claw" Button installed).

Coins Per Play - S3 Positions 3 and 4

This switch determines the number of coin inputs credits required to purchase a single Game Play credit

If these switches are set to allow "Free Play," the credit section of the credit/timer display will show "99" games available for play. After the start of each game, the credit display will show "98" games available for play. At the end of each game, the display will revert to showing "99" games available for play.

Factory setting is Two Coins per Play for *Bean Bag Cranes*, *Clean Sweep*, *Bear Claw*, and *Prize Time*.

Factory setting is One Coin per Play for *Candy Crane* and *PT30" Candy Crane*.

Coin Inputs Given Per DBA Pulse - S3 Positions 5 and 6

These switches allow control of the number of coin input pulses given for each Dollar Bill Acceptor pulses.

Factory setting for Coin Inputs Given Per DBA Pulse is Four Coin Inputs for each DBA pulse, with the DBA Factory set to give 1 Pulse per Dollar.

DIP SWITCH SETTINGS DESCRIPTIONS - S3 CONTROLS (continued)

Burn-In / Game Timer - S3 Positions 7 and 8

These switches control the maximum length of time the player will be allowed to move the crane head over the playfield during each attempt to select and win a prize. The selected game play time will be displayed on the timer section of the credit/timer display when no credits are present on the game, and is also displayed at the start of every game.

Factory setting for Game Play Time is 20 seconds.

When the "Burn-In Mode" is turned on by Position 8 of DIP Switch Bank S5, these two switches will determine the idle time between each crane movement cycle. "Burn-In" is a test mode only. With this mode on, game play is not allowed. The crane will move about the playfield in a manner determined by the BP2000 controlling program.

Factory setting for Burn-In operation defaults to 7 seconds when the Game Play Time is set for 20 seconds.

DIP SWITCH SETTINGS DESCRIPTIONS (continued)

S5 CONTROLS

Bonus Credits Given? - S5 Position 1

If this switch is in the ON position, Bonus Game Play credits will be given to the player if the player purchases a series of consecutive Game Play credits. Once game play is initiated, the count of the number of consecutive Game Play credits purchased will be reset to zero.

The number of consecutive Game Play credit purchases that are needed to acquire Bonus Game Play credits - as well as the number of Bonus Game Play credits given once the necessary number of consecutive Game Play credits have been purchased - are set by the operator in the *Software Settings* section of the "Audit/Test" mode

The number of consecutive Game Play credit purchases that are needed to acquire Bonus Game Play credits is set in the "b.d." section of the *Software Settings*.

The number of Bonus Game Play credits given once the necessary number of consecutive Game Play credits have been purchased is set in the "b.c." section of the *Software Settings*.

Refer to the "Audit/Test" mode section of this manual for more information on these settings.

[NOTE: For software releases dated after June of 2001, option "b.d." and "b.c." in the "Audit/Test" mode will NOT be displayed UNLESS DIP Switch S5-Position 1 is placed in the ON position.]

Factory setting for giving Bonus Credits is OFF (NO Bonus Credits will be given)

Dual-Value Coin Mechanism Installed? - S5 Position 2

If the machine incorporates a coin mechanism that allows coins with different values to be inserted into each of the two separate coin input slots (such as a coin mechanism that takes quarters in one slot and dollar coins in the other slot), the "Dual-Value Coin Mechanism Installed" DIP Switch should be turned ON

With this switch in the ON position, "c.1." and "c.2." in the *Software Settings* section of the "Audit/Test" mode can be used to set up multipliers for each coin slot. For example, if one of the coin slots takes quarters and the other coin slots takes dollar coins, the multiplier value for the quarter slot should be set to "1" and the multiplier for the dollar slot should be set to "4".

By turning the "Dual-Value Coin Mechanism Installed" DIP Switch ON, the single switch actuation caused by a single coin drop (such as a dollar coin insert) can be used interpreted by the software to equal to larger number of coin drops (such as 4 quarter drops)

Refer to the "Audit/Test" mode section of this manual for more information on these settings.

[NOTE: For software releases dated after June of 2001, option "c.1." and "c.2." in the "Audit/Test" mode will NOT be displayed UNLESS DIP Switch S5-Position 2 is placed in the ON position.]

Factory setting for "Dual-Value Coin Mechanism Installed?" is OFF
(a Dual-Value Coin Mechanism is NOT installed).

DIP SWITCH SETTINGS DESCRIPTIONS - S5 CONTROLS (continued)

Unused - S5 Position 3

This switch is not used in this software application and has NO effect on Game Play operation.

Factory setting for DIP Switch S5 - Position 3 is OFF.

Attract Mode Desired? - S5 Position 4

The "Attract Mode Desired?" switch controls whether or not the crane head will be allowed to perform a *Mechanical Attract routine* during periods when no Game Play credit is available. The *Mechanical Attract routine* can serve as a visual attraction to potential players.

If the "Attract Mode Desired?" switch is placed in the ON position, the crane head will move about the playfield at intervals determined by the controlling software. During the *Mechanical Attract routine*, the crane head will move sequentially to the three non-home corners of the playfield, changing directions as each limit of travel is reached. When the crane moves to just right of the prize hole, motion will be stopped and the claw will drop slightly, close twice, then reopen. The claw will then be raised, and the crane head will again return to the "home" position over the prize box. The frequency of occurrence of this crane movement can not be adjusted.

Factory setting for *Bear Claw*, *Clean Sweep*, *Prize Time*, and *PT30" Candy Crane* is ON
(Attract Mode operation IS desired)

Factory setting for *Candy Crane* and *Bean Bag Crane* is OFF
(Attract Mode operation is NOT desired).

Unused - S5 Position 5

This switch is not used in this software application and has NO effect on Game Play operation.

Factory setting for DIP Switch S5 - Position 5 is OFF.

2 Channel Rope Light / 3 Channel Rope Light - S5 Position 6

This switch determines whether the rope light drivers on the BP2000 controller board drive two lamp circuits in an alternating pattern (switch is OFF), or three lamp circuits in a chase light-style pattern (switch is ON)

Factory Setting is ON (2 Channel Rope Light Driving Pattern is desired).

DIP SWITCH SETTINGS DESCRIPTIONS - S5 CONTROLS (continued)

Prize Detection Installed? - S5 Position 7

If the "Prize Detection Installed?" DIP switch is placed in the ON position, the controlling software will assume that a Prize Detection system has been installed in the machine. With this switch in the ON position, the software will look at the output of the Prize Detection system after each game played to determine if a prize has been won. Additionally, "Win" or "Lose" commentary - based on the last game played - will be provided once all available Game Play credits have been exhausted.

NOTE 1: This switch should only be placed in the ON position if the game incorporates a Prize Detection system.

NOTE 2: If this switch is placed in the OFF position, games incorporating a prize detection system will NOT keep track of the prizes won by players, nor give "WIN" or "LOSE" sound commentary.

NOTE 3: For software releases dated after June of 2001, the presense of a prize detection system will AUTOMATICALLY be assumed if the "Play Till You Win Desired?" Switch (DIP Switch S2-Position 8) is placed in the ON position. Thus, if the "Play Till You Win Desired?" Switch is placed in the ON position, the "Prize Detection Installed?" Switch (DIP Switch S5-Position 6) will have NO effect on game operation.

NOTE 4: For software releases dated after June of 2001, option "P.C." (Prize Detection Testing) in the "Audit/Test" mode will NOT be displayed UNLESS DIP Switch S5-Position 1 is placed in the ON position
OR
the "Play Till You Win Desired?" Switch (DIP Switch S2-Position 8) is placed in the ON position.

Factory setting for "Prize Detection Installed?" is ON
if the machine incorporates a Prize Detection system.

Factory setting for "Prize Detection Installed?" is OFF
for machines not incorporating a Prize Detection system.

DIP SWITCH SETTINGS DESCRIPTIONS - S5 CONTROLS (continued)

Burn-In Mode Desired?- S5 Position 8

Placing the "Burn-In Mode Desired?" DIP Switch in the ON position will cause the controlling program to execute the *Factory Burn-In routine*. "Burn-In" is a test mode only! Game play is NOT allowed when the program is executing the *Factory Burn-In routine*.

During the *Factory Burn-In routine*, crane head operation will alternate between two crane head movement routines

During the first crane head movement routine, the crane head will move sequentially to the three "non-home" corners of the playfield, changing directions as each limit of travel is reached. The crane head will then return to the "home" position over the prize box. Once at the "home" position, the claw will be lowered into the prize box. When the lowest limit of downward travel is reached, the claw solenoid will be energized then de-energized, closing and opening the claw. Finally, the claw will be raised. Once the upper limit of claw travel is reached, idle period timing will begin in preparation for the next crane head movement cycle.

At the start of the second crane head movement routine, the crane head is moved to the center of the play field. The crane head is then oscillated left and right 10 times, then forward and back 10 times. The claw is then dropped in increments. Once the lowest limit of downward travel is reached, the solenoid will be energized the de-energized, closing and opening the claw. The claw is then raised. When the upper limit of claw travel is reached, the crane head is returned to the "home" position. Once the crane head reaches the "home" position, idle period timing will begin in preparation for the next crane head movement cycle

The idle period between crane movement cycles is controlled by DIP Switch S3 - Positions 7 and 8.

During the first crane movement routine, each crane head limit switch is tested and tracked. These limit switches are the Up Limit switch, the Down Limit switch, the Forward Limit switch, the Back Limit switch, the Right Limit switch, and the Left Limit switch. While the last 6 seconds of idle period timing is being displayed on the TIMER display, the CREDIT display will show the number of times that a given crane head limit switch was NOT observed to be properly actuated before movement time in that direction expired. The Code (corresponding with each of the last 6 seconds of idle period timing displayed) that corresponds with each crane head limit switch is shown in the table below. (The CREDIT display has a maximum error count of 99 per switch circuit)

<u>CODE</u>	<u>SWITCH CIRCUIT</u>
1	Up Limit
2	Down Limit
3	Left Limit
4	Forward Limit (By the Front Glass)
5	Right Limit
6	Back Limit (By the Mirror)

Factory setting for the "Burn-In Mode Desired?" Switch is OFF.

SOFTWARE SETTINGS MODE

Entering the *Software Settings Mode*

To enter the *Software Settings Mode*, press the "Audit/Test" button on the board one time. The Audit/Test button (S1) is located next to the rectangular IC socket along one edge of the BP2000 controller board.

Moving Between Settings

When the BP2000 controller board is in the *Software Settings Mode*, the CREDIT (upper) section of the credit/timer display will show the present Audit/Setting/Test available for adjustment or examination.

NOTE: The claw strength setting value uses the second digit of the CREDIT display for adjustment information.

To advance to the next setting in the *Software Settings Mode*, push the joystick forward, toward the machine.

To move backward to the previous setting, pull the joystick backwards, toward yourself.

Note: If you have push buttons on your console, values will wrap around when you have reached minimum or maximum settings.

Display and Adjustment of the Audit/Setting/Test values

Once an Audit/Setting/Test has been chosen to adjust or examine, the TIMER (lower) part of the credit/timer display will show the present value for the audit, setting, or test shown on the CREDIT display.

To increase a setting value, push the joystick to the Right.

To decrease a setting value, push the joystick to the Left.

Note: If you have push buttons on your console, values will wrap around when you have reached minimum or maximum settings.

Software Settings - Audit/Test Mode

<u>Description</u>	<u>Credit Indicator</u>	<u>Timer Default</u>
c.c. Operator game test - When this Software Setting is displayed, the number of Test Credits is shown on the TIMER display. While in the <i>Software Settings Mode</i>, any Game Credits placed on the machine will be converted to Test Credits. This setting allows the operator to test both DBA and Coin Mechanism operation without affecting the Coin Meter or Internal Audits. If Test Credits are available and the "Audit/Test" mode is exited through "S.S." (Save Settings, described below), the CREDIT display will show the number of Test Credits available for Test Play. Additionally, all of the decimal points on the credit/timer display will be lit to indicate that the available credits are Test Credits. These Test Credits can be played as if they were true Game Credits. "Wins" seen by the Prize Detector Assembly (if installed) will NOT affect the Prize Meter. Once all Test Credits have been played, the decimal points on the credit/timer display will be extinguished, and the machine is again ready for normal operation. [NOTE: If the <i>Software Settings Mode</i> is entered with ANY Game Credits available for play, these Game Credits immediately become Test Credits. In this event, the Coin Meter and Internal Audits will have already been updated, causing inaccuracies in that information.]	c c.	0 0.
c. Claw strength - While in this Software Setting selection, the Claw Strength Setting - as controlled by the Claw Strength Potentiometer - will be displayed. The Claw Strength Setting will range from 60 to 276. This setting allows you to adjust the claw strength from approximately 8.5 VDC - 26 VDC, corresponding to approximately 200mA to 620mA of solenoid current. The small letter "c" indicates that you are in this setting; the remaining 3 digits show the present setting. The factory default for games with the small claw assembly is 90. For games with the medium or large claw assembly, the factory default is 160.	c #.	#.#.

Software Settings - Audit/Test Mode - (continued)

<u>Description</u>	<u>Credit Indicator</u>	<u>Timer Default</u>
d.S. Reset Defaults - If this Software Setting selection is being displayed, Moving the Joystick to the Left or Right will reset ALL Software Settings to their default values "0.0." displayed in the TIMER display indicates that all Software Settings are at their default values. "0.1." displayed in the TIMER display indicates that AT LEAST one of the Software Settings is NOT at its default value.	d.S	0.0. or 0.1.

NOTE: If the main EPROM (IC U1) is ever replaced in a BP2000 controller board, ALWAYS **RESET DEFAULTS BEFORE** attempting any further game set up. Doing this initializes ALL software setting values to their proper range.

Failure to RESET DEFAULTS after changing the main EPROM can lead to unexpected and/or undesired operation of the game.

c.1. Dual-Value Coin Mechanism Multiplier 1 - This Software Settings allows the operator to set a multiplier value for the first Coin Input Slot of a Dual-Value Coin Mechanism. (a "Dual-Value" coin mechanism accepts one coin size through one slot of the mechanism, and a different coin size through the second slot of the mechanism)	c.1.	0.1.
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This multiplier value is ONLY valid if the "Dual-Value Coin Mechanism Installed?" Switch (DIP Switch S5 - Position 2) is placed in the ON position.
[See the *BP2000 DIP Switch Settings* table in this section of the manual for adjustment of the "Dual-Value Coin Mechanism Installed?" DIP Switch]

With the "Dual-Value Coin Mechanism Installed" Switch in the ON position, each coin dropped through the first Coin Input Slot will be multiplied by the multiplier number set with this Software Setting.

To increase the multiplier value, move the joystick to the right.
To decrease the multiplier value, move the joystick to the left.

The minimum multiplier value is "0.1 ".
The maximum multiplier value is "0.9."
The Default Setting for "c.1." is "0.1.".

[NOTE: For software releases dated after June of 2001, Software Setting "c.1 " will NOT be displayed UNLESS DIP Switch S5-Position 2 is placed in the ON position]

Software Settings - Audit/Test Mode - (continued)

Description

Credit Indicator

Timer Default

c.2. Dual-Value Coin Mechanism Multiplier 2 -

c.2.

0.2

This Software Settings allows the operator to set a multiplier value for the second Coin Input Slot of a Dual-Value Coin Mechanism.

(a "Dual-Value" coin mechanism accepts one coin size through one slot of the mechanism, and a different coin size through the second slot of the mechanism.)

This multiplier value is ONLY valid if the "Dual-Value Coin Mechanism Installed?" Switch (DIP Switch S5 - Position 2) is placed in the ON position. [See the *BP2000 DIP Switch Settings* table in this section of the manual for adjustment of the "Dual-Value Coin Mechanism Installed?" DIP Switch.]

With the "Dual-Value Coin Mechanism Installed" Switch in the ON position, each coin dropped through the second Coin Input Slot will be multiplied by the multiplier number set with this Software Setting.

To increase the multiplier value, move the joystick to the right
To decrease the multiplier value, move the joystick to the left.

The minimum multiplier value is "0.1".
The maximum multiplier value is "0.9".
The Default Setting for "c.2." is "0.2".

[NOTE: For software releases dated after June of 2001,
Software Setting "c.2." will NOT be displayed
UNLESS DIP Switch S5-Position 2 is placed in the ON position.]

Software Settings - Audit/Test Mode - (continued)

Description

Credit Indicator

Timer Default

b.d. Number of Consecutive Game Play Credits that must be Purchased to Receive Bonus Credits -

b.d

0.2.

This Software Setting allows the operator to set the Number of Consecutive Game Play Credits that must be Purchased by a player before the player will receive Bonus Credits.

The value set through this Software Setting is ONLY valid if the "Bonus Credits Given?" Switch (DIP Switch S5 - Position 1) is placed in the ON position. [See the *BP2000 DIP Switch Settings* table in this section of the manual for adjustment of the "Bonus Credits Given?" DIP Switch.]

With the "Bonus Credits Given?" Switch in the ON position, consecutive Game Credits purchased by a player - BEFORE initiating any game play - will count towards the purchase of Bonus Credits. Once the number of consecutive Game Credits purchased is equal to the threshold value established with this (the b.d.) Software Setting, the player will receive the number of Bonus Credits set through the "Bonus Credits to be Given" (b.c.) Software Setting (described below). If the player continues to purchase Game Credits, Bonus Credits will again be given for the next series of consecutive Game Credit purchases.

Once game play is initiated by the player, the number of consecutive Game Credits purchased is reset to 0

To increase the Consecutive Game Credit Purchases needed to receive Bonus Credits value, move the joystick to the right.
To decrease the Consecutive Game Credit Purchases needed to receive Bonus Credits value, move the joystick to the left.

The minimum number of Consecutive Game Credit Purchases needed to receive Bonus Credits is "0.1".
The maximum number of Consecutive Game Credit Purchases needed to receive Bonus Credits is "9.9".
The Default Setting for "b d." is "0.2".

[NOTE: For software releases dated after June of 2001, Software Setting "b d." will NOT be displayed UNLESS DIP Switch S5-Position 1 is placed in the ON position.]

Software Settings - Audit/Test Mode - (continued)

Description

Credit Indicator

Timer Default

b.c. Bonus Credits to be Given - This Software Setting allow the operator to set the Number of Bonus Credits given to a player for the consecutive purchase of a series of Game Play Credits.

b.c.

0.1

The value set through this Software Setting is ONLY valid if the "Bonus Credits Given?" Switch (DIP Switch S5 - Position 1) is placed in the ON position [See the *BP2000 DIP Switch Settings* table in this section of the manual for adjustment of the "Bonus Credits Given?" DIP Switch.]

Refer to the description of *Number of Consecutive Game Play Credits that must be Purchased Credits to Receive Bonus Credits* for a detailed description of the relationship between Software Setting "b.c." and Software Setting "b.d."

To increase the number of Bonus Credits to Be Given, move the joystick to the right.

To decrease the number of Bonus Credits to Be Given, move the joystick to the left.

The minimum number of Bonus Credits that will be Given is "0.1".

The maximum number of Bonus Credits that will be Given is "0.9".

The Default Setting for "b.c." is "0.1".

[NOTE: For software releases dated after June of 2001, Software Setting "b.d." will NOT be displayed UNLESS DIP Switch S5-Position 1 is placed in the ON position.]

L.S. Rope Light Flash Speed - This Software Setting allows the operator to adjust the flash rate of any rope lights installed on the machine.

L.S.

1.0.

To increase the Rope Light Flash Speed, move the joystick to the right.

To decrease the Rope Light Flash Speed, move the joystick to the left.

The slowest Rope Light Flash Speed that can be selected is "0.1".

The fastest Rope Light Flash Speed that can be selected is "2.0".

The Default Setting for Rope Light Flash Speed is "1.0".

NOTE: The Number of Rope Light Channels available is set by DIP Switch S5 - Position 6.

Software Settings - Audit/Test Mode - (continued)

<u>Description</u>	<u>Credit Indicator</u>	<u>Timer Default</u>
d.d. Number of Items to be Dispensed by an Added Dispenser for each Game Credit Purchased -	d d.	0 1.

This Software Setting allow the operator to set the number items that will be dispensed by an added Card Dispenser or Gumball/Bulk Vendor Dispenser for each PURCHASED Game Play Credit.

The value set through this Software Setting is ONLY valid if the "Card Dispenser Installed?" Switch (DIP Switch S5 - Position 1) is placed in the ON position. [See the *BP2000 DIP Switch Settings* table in this section of the manual for adjustment of the "Card Dispenser Installed?" DIP Switch]

To increase the Number of Items to be Dispensed,
move the joystick to the right.

To decrease the Number of Items to be Dispensed,
move the joystick to the left.

The fewest Number of Items that can be Dispensed by an
an Added Dispenser for each Game Credit Purchased is "0 1 ".

The greatest Number of Items that can be Dispensed by an
an Added Dispenser for each Game Credit Purchased is "2 0 ".

The Default Setting for "d d." is "0.1 ".

[NOTE: For software releases dated after June of 2001,
option "d.d." in the "Audit/Test" mode will NOT be displayed
UNLESS DIP Switch S3-Position 1 is placed in the ON position]

S.S. Save Settings - This Software Setting is used to save any changes that have been made to the other Software Settings and should be used as the exit point from the "Audit/Test" routine.	S S.	0.0.
--	------	------

Move the Joystick Left OR Right
to save any Software Setting changes
and to exit from the Audit/Test routine
back to normal game operation.

NOTE: If any changes are made to the other Software Settings,
AND it is desired that those changes be properly saved in memory,
the "Audit/Test" mode MUST be exited through the "S.S." Software Setting.
If the BP2000 controller board is reset, or the game is power-cycled,
BEFORE the Software Setting changes are saved,
any Software Setting changes WILL BE DISCARDED.

Tests - Audit/Test Mode

Description

Credit Timer
Indicator Default

FB Forward / Back motor and limit switch test.

F B

This setting allows testing of the Forward/Back motor and its associated Limit Switches

Moving the Joystick to the right will cause the Forward/Back motor to move the crane head towards the backboard of the game.

Moving the Joystick to the left will cause the Forward/Back motor to move the crane head towards the front glass of the game

When the back limit of travel is reached and/or the back limit switch is activated, the upper two segments on the TIMER display will light. With the back limit switch activated, the Forward/Back motor should stop turning, preventing further movement backwards.

When the forward limit of travel is reached and/or the forward limit switch is activated, the lower two segments on the TIMER display will light. With the forward limit switch activated, the Forward/Back motor should stop turning, preventing further movement forwards.

RL Right / Left motor and limit switch test.

R L

This setting allows testing of the Right/Left motor and its associated Limit Switches

Moving the Joystick to the right will cause the Right/Left motor to move the crane head towards the right side of the game.

Moving the Joystick to the left will cause the Right/Left motor to move the crane head towards the left side of the game.

When the right limit of travel is reached and/or the right limit switch is activated, the two right-most segments on the TIMER display will light. With the right limit switch activated, the Right/Left motor should stop turning, preventing further movement towards the right.

When the left limit of travel is reached and/or the left limit switch is activated, the two left-most segments on the TIMER display will light. With the left limit switch activated, the Right/Left motor should stop turning, preventing further movement towards the left

Tests - Audit/Test Mode - (continued)

Description

<u>Credit</u>	<u>Timer</u>
<u>Indicator</u>	<u>Default</u>

U D

UD Up / Down motor and limit switch test / Claw test.

This setting allows testing of the Up/Down motor and its associated Limit Switches. Testing of the claw is also allowed in this mode.

Moving the Joystick to the right will cause the Up/Down motor to raise the claw.

Moving the Joystick to the left will cause the Up/Down motor to drop the claw.

When the up limit of travel is reached and/or the up limit switch is activated, the upper two segments on the TIMER display will light. With the up limit switch activated, the Up/Down motor should stop turning, preventing further upwards movement of the claw.

When the down limit of travel is reached and/or the down limit switch is activated, the lower two segments on the TIMER display will light. With the down limit switch activated, the Up/Down motor should stop turning, preventing further downwards movement of the claw.

Pressing the Joystick fire button at any time will cause the BP2000 controller board to attempt to close the claw. The claw will close at full strength with one press of the fire button, and at the strength set by the Claw Strength Potentiometer on the next press of the fire button. The claw strength will alternate back and forth between the two settings on subsequent pressings of the Joystick fire button. By alternating between full strength and the potentiometer strength setting, this mode demonstrates both options of the claw strength.

PC Prize Curtain / Prize Detector Test

P C

8.8.

If the prize detector assembly is properly aligned,

TIMER display will show "8.8." (all segments of each block lit).

If the prize detector assembly is blocked or not in proper alignment, the TIMER display will be blank.

Additionally, blocking of the prize detector will cause a series of tones to be sounded. The series of tones will continue to be produced until the prize detector assembly is unblocked, the assemblies are properly aligned, or this test is exited.

[NOTE: For software releases dated after June of 2001, option "P.C." (Prize Detection Testing) in the "Audit/Test" mode will NOT be displayed UNLESS DIP Switch S5-Position 1 is placed in the ON position
OR
the "Play Till You Win Desired?" Switch (DIP Switch S2-Position 8) is placed in the ON position.]

Audits - Audit/Test Mode

<u>Description</u>	<u>Credit Indicator</u>	<u>Timer Default</u>
d.2. Non resettable coins in Audits (most significant digit)	d.2.	# #.
d.1. Non resettable coins in Audits (intermediate significant digit)	d.1.	# #.
d.0. Non resettable coins in Audits (least significant digit)	d.0.	# #.

This audit is an internal function to maintains a count of the number of coins that have been put in for the life of the machine

To read this internal meter, use the following example.

Example: For a total number of coins of 345,786

Setting d.2. would indicate 3 4 on the TIMER display (MSD)
Setting d.1. would indicate 5 7. on the timer (ISD)
Setting d.0. would indicate 8 6. on the timer (LSD)

Note: The count will not be reset until the removal and installation of a new EPROM (IC U4 on BP2000 Controller Board).

ADJUSTMENT OF THE PRIZE DETECTOR ASSEMBLIES

Need for Proper Alignment

To properly detect prize wins and to maintain an accurate count of those wins, the Prize Detector Assemblies must be properly aligned

CLEAN SWEEP, BEAR CLAW, and PRIZE TIME

[NOTE: The Light Curtain Prize Detection System is STANDARD on *Clean Sweep* machines
Any Prize Detection System is OPTIONAL on *Bear Claw* and *Prize Time* machines.]

Using the Prize Detector Assembly Indicators to Determine Alignment

On the back of each Prize Detector Assembly are indicator LEDs. An indicator LED will be lit if a ray path from one Prize Detector Assembly to a Prize Detector Assembly on the opposite side of the prize box is blocked. One or more indicator LEDs will also be lit if the units are out of alignment with each other.

Using the BP2000 Test Mode to Determine Alignment

Alternatively, the Prize Detector Assemblies' alignment may be tested using the Prize Detector Test Mode (PC) in the "Audit/Test" section of the BP2000 controller board. Enter the "Audit/Test" mode by pressing the *Audit/Test* button on the BP2000 controller board one time. Scroll through the setup, audit, and test indicators until "PC" is shown on the CREDIT (upper) display. If the Prize Detector Assemblies are aligned with each other, the TIMER (lower) display will show "8 8 ". If the Prize Detector Assemblies are not aligned, or if any of the ray paths are blocked when testing the operation of the assemblies, the TIMER display will be blank and an audible sound will be heard. The assemblies should be adjusted until the tone is no longer heard, and "8 8." is shown on the timer display.

Performing the Mechanical Adjustments

The Prize Detector Assemblies are firmly mounted to the machine's prize box. The prize box itself is designed with light tubes and pre-drilled mounting holes to increase the accuracy of the prize detection system. This arrangement creates a stable system and reduces alignment difficulties. Once the prize detector assemblies are properly attached to the prize box, movement of the two assemblies provides - at most - a combination of 1/8" of play between the two assemblies.

To adjust the alignment of the Prize Detector Assemblies, loosen (but DO NOT REMOVE) the screws securing the Prize Detection Assemblies to the wooden sides of the prize box. Slide each assembly until proper alignment (as described above) is indicated. Then, resecure the Prize Detector Assemblies into place.

If proper alignment cannot be achieved, the Prize Detector Assemblies may need to be removed to insure that the transmitter LEDs and receiver phototransistors are properly aligned with the openings on the metal Prize Detector Assembly bracket OR that dust or debris is not blocking a ray path. To align the transmitter LEDs or receiver phototransistors, VERY CAREFULLY move these items to insure that they are aligned with the holes on the metal Prize Detector Assembly bracket. Once transmitter LED and photoreceiver alignment has been established AND any dust or debris has been removed from these items, reassemble the Prize Detector Assemblies and reinstall them in the machine. If proper Prize Detector Assembly operation cannot be achieved (and it has been determined that there are no problems with any wiring from the Prize Detector Assemblies to the BP2000 controller board), the Prize Detector Assemblies should be replaced.

BEAN BAG CRANE and CANDY CRANE

Structure and Desired Operation of the Photoeye Prize Detector System

The Prize Detection system used on *Bean Bag Crane* and *Candy Crane* consists of a Photoeye mounted on one side of the prize box and a piece of reflective tape on the opposite side of the prize box. Prize detection occurs when the light path from the Photoeye to the reflective tape is disrupted.

Alignment of the Photoeye Prize Detector system involves aligning the reflective tape to allow proper reflection of the Photoeye light beam when no prize is present.

Using the Photoeye Indicator to Determine Alignment

On the back of the Prize Detector Photoeye is an indicator LED.

NOTE: Depending upon the particular Photoeye used,
the indicator LED may be OFF when proper alignment is achieved
and ON when misalignment or a blockage occurs
OR
the indicator LED may be ON when proper alignment is achieved
and OFF when misalignment or blockage occurs.

The state of the indicator LED can be check in connection with
the Prize Detection Test Mode in the "Audit/Test" routine
to determine exactly how the indicator LED reacts when aligned.

The reflective tape on the opposite side prize box from the Prize Detector Photoeye can be adjusted into position by observing the reaction of the indicator LED on the rear of the Prize Detector Photoeye

Once the general position for proper alignment is found, the reflective tape should be moved up, down, left, and right to find the maximum area of detection. Once the maximum area of detection is known, the reflective tape can be centered to achieve the best possible alignment relative to the Photoeye beam.

Once alignment has been achieved, the reflective tape should be secured into place to firmly establish the desired alignment.

Using the BP2000 Test Mode for Adjusting the Reflective Tape

The Prize Detector Test Mode (PC) in the "Audit/Test" section of the BP2000 controller board may also be used to align the reflective tape. Enter the "Audit/Test" mode by pressing the "Audit/Test" button on the BP2000 controller board one time. Scroll through the Setup, Audit, and Test indicators until "PC" is shown on the CREDIT (upper) display. If the reflective tape is aligned with the photoeye, the TIMER (lower) display will show "8 8.". If the reflective tape is not aligned, or if the ray path is blocked when testing the operation of the Photoeye, the TIMER display will be blank and a tone will be heard. The reflective tape should be adjusted until the tone is no longer heard, and "8 8" is shown on the timer display.

Once the general position for proper alignment is found, the reflective tape should be moved up, down, left, and right to find the maximum area of detection. Once the maximum area of detection is known, the reflective tape can be centered to achieve the best possible alignment relative to the Photoeye beam.

Once alignment has been achieved, the reflective tape should be secured into place to firmly establish the desired alignment.

ADJUSTMENT OF THE CLAW STRENGTH

(Electronic adjustment of claw strength not available on games manufactured for sale in the state of California)

Necessity of Adjusting the Claw Strength

Control over the strength of the claw is critical. The ability of the claw to pick up prizes determines how much merchandise will be given to the playing customers. Because the size and weight of merchandise placed in a game will vary from operator to operator, the strength of the claw may need to be adjusted differently than the factory setting to establish a proper play skill level for the merchandise being vended.

Methods of Claw Strength Adjustment

The claw strength can be adjusted in two ways:

- 1) Electrically, through the strength of the claw coil, and
- 2) Mechanically, through adjustments to the claw itself.

Electrical Adjustment Control Location

The strength of the claw coil is adjusted through the claw strength potentiometer, labeled both "R38" and "Claw Strength," on the BP2000 controller board. This potentiometer is located about 1 inch from connector JP1 along the edge of the BP2000 controller board.

How to Adjust the Claw Strength

Refer to the "Audit/Test" section of this manual to access the *Claw Strength* Adjustment section of the software controls. Once the *Claw Strength* Adjustment mode is accessed, the claw strength potentiometer can be used to set the desired claw strength. In this mode, the left digit of the CREDIT (upper) part of the credit/timer display will show a "c". The right digit of the CREDIT display will show a "0", a "1" or a "2". The TIMER (lower) part of the credit/timer display will show another two digit number. The combination of the three numbers from the CREDIT and TIMER displays will allow adjustments in the range of "060" through "276", representing about 8.5 VDC through 26 VDC, respectively. The number shown on the credit/timer display represents the position of the claw strength potentiometer. Rotating the knob on the claw strength potentiometer clockwise or counter-clockwise will increase or decrease, respectively, the number shown on the credit/timer display. This will, in turn, increase or decrease the claw strength during game play.

Claw Coil Voltage Test Points

Many operators want a direct measurement of the DC voltage at the claw. The claw coil voltage can be measured at two points. The drive signal for the claw coil comes from the black and brown wires at Pins 1 and 2, respectively, of connector JP6 on the BP2000 controller board itself. Placing a voltmeter across these wires at connector JP6 will allow measurement of the claw voltage any time the claw solenoid is energized. The claw coil voltage may also be measured at the two-position terminal block on the crane head assembly. This point can be reached only after removing the metal shroud covering the claw string area of the crane assembly. The voltage at the crane head terminal block will be about 0.1 VDC or so less than the voltage measured at the BP2000 controller board, due to some voltage drop in the long claw coil drive wires.

Once a proper coil strength has been set and is known, periodic checks of the claw coil voltage can help to maintain consistent claw strength over time. Knowing the particular coil voltage and potentiometer setting can also help in making later adjustments to the game and claw coil strength, if the game is not vending the desired amount of merchandise.

ADJUSTMENT OF THE CLAW STRENGTH - (continued)

NOTE: Voltage measurements may vary slightly as the temperature of the coil varies. Changes in the temperature of the coil will affect the resistance of the coil. The BP2000 controller board, though, uses a constant current driver to control the current to the coil. Although voltage measurements may vary, the current through — and hence the strength of — the coil should remain constant once a particular coil strength is set by the claw strength potentiometer.

When to Take Measurements of the Coil Voltage

The coil voltage can be measured at any time during game play when the claw is rising or as the crane head assembly is headed to the "home" position over the prize box. During *Claw Strength* Adjustments while in the "Audit/Test" mode, the coil voltage can be measured any time that the red "fire" button on the joystick is pressed.

The coil voltage can also be measured during the *Up / Down motor and limit switch test / Claw Test* of the "Audit/Test" mode. Refer to the **Tests - Audit/Test Mode** section of this manual for information on how to enter the *Up / Down motor and limit switch test / Claw Test* mode. Once in this mode, pressing the red claw drop button (on machines with a joystick) will alternately close the claw at full strength and at the strength set by the claw strength potentiometer. Measurements of the coil voltage can be made while the red claw drop button is pressed during this Test mode.

Once the claw strength potentiometer has been adjusted, always check the claw strength to insure that the claw strength is as desired.

Mechanical Adjustments Controlling Claw Strength

The claw strength is most sensitive to mechanical adjustment. Even small changes in the position of the rings on the claw can have a great effect on the ability of the claw to pick up merchandise and deliver it to the prize box.

It is recommended that adjustments to the claw strength only be made through control of the voltage to the claw coil; inappropriate adjustment of the claw's mechanical position can severely affect the behavior of the claw!

Performing the Mechanical Adjustments

The fingers may be adjusted (on some claw options) with the rings on the claw housing. The rings are held in place with two set screws each. These should be adjusted so the fingers are closed when the claw coil is energized. The claw finger assembly should not normally slide up and down the coil housing after the rings are in place.

If the top ring is adjusted toward the top of the assembly, allowing the finger assembly to slide up and down the housing of the coil, the fingers will be more likely to drop the merchandise even if the claw strength potentiometer is set at its highest setting. Because this adjustment is commonly used to greatly reduce the amount of merchandise vended to playing customers, **ALWAYS use caution when incorporating this feature.**

SECTION THREE:

THEORY OF OPERATION

ELECTRICAL COMPONENTS IN THE GAME

Crane Head Assembly
Joystick (or optional Push Buttons)
Bill Acceptor (optional)
Coin Mechanism
Rope Lights (optional)
Internal Lighting
Component Board
BP2000 System Hardware Description
Credit/Timer Display
Prize Detector Assembly (optional)
Card Dispenser unit (optional)

CRANE HEAD ASSEMBLY

Electrical Composition of the Crane Head Assembly

Electrically, the crane head assembly consists of three motors, six limit switches, and a coil.

Operation of the Crane Head Assembly Motors

Each crane head assembly motor has two connections to supply power to it. Power for the motors is supplied through the 25 VAC winding of the main transformer on the component board. Circuitry on the BP2000 controller board produces a DC voltage and drives the motors through other control circuitry on the component board. By changing the polarity of the voltage at the motors, the direction of rotation of the motors can be controlled to allow one motor to move in opposing directions of operation.

Operation of the Coil

Power for the coil is supplied through the same 25 VAC winding of the main transformer on the component board supplying power for the motors. As with the motors, circuitry on the BP2000 controller board produces a DC voltage and drives the coil through other control circuitry on the BP2000 controller. When power is supplied to the coil, the coil will produce a magnetic field. The strength of this magnetic field is proportional to the current through the coil. The BP2000 controller board circuitry uses a controllable constant current source to maintain the chosen current level through the coil. The magnetic field of the coil closes the claw to pick up prizes from the playfield. Once closed, the claw will carry prizes to the prize box.

Operation of the Limit Switches

All of the limit switches on the crane head assembly are three-terminal micro switches. At any given time, a limit switch is either actuated or not actuated. The limit switches on the crane head assembly are configured as either "normally open" (N/O) or "normally closed" (N/C). The common (COM) terminal on all the limit switches is connected to digital ground on the component board. The limit switches act as digital inputs and produce either a "high" or a "low" voltage for the circuitry on the BP2000 controller board. When a limit switch is actuated, the state of the internal connections in the switch changes, causing the voltage across the switch contacts to change. This change is sent — via the crane head assembly electrical harness — to the BP2000 controller board, which is programmed to respond to the particular change.

Definitions of "Normally Open" and "Normally Closed"

Each micro switch used on the game has three connections: a common (COM) terminal, a normally open (N/O) terminal, and a normally closed (N/C) terminal. The "normal" state of the switch is when the switch is not being actuated; i.e., the small plunger on the switch is not being pressed inward. Under this condition, the N/C terminal contact on the switch is connected to the COM terminal contact and the N/O terminal contact is not connected to the COM terminal. When the switch is actuated, the small plunger on the switch is pressed inward and the situation reverses. The N/O terminal contact connects to the COM terminal, and the N/C terminal no longer connects to the COM terminal contact.

JOYSTICK

The joystick is operated by the customer in an attempt to win prizes. Electrically, the joystick controls five micro switches. Actuating these micro switches causes the control circuitry on the BP2000 controller board to move the crane head assembly about the play field. All the micro switches on the joystick are configured as "normally open" switches.

See the section Definitions of "Normally Open and Normally Closed" in the **Crane Head Assembly** sub-section of **Theory of Operation-Electrical** in this section of the manual for a description of the operation of the micro switches on the joystick.

PUSH BUTTON CONTROLS (optional)

Games having the push button control option use only two micro switches — one on each button. Pressing each button actuates the micro switch associated with that button. The micro switches on these buttons operate in the same manner as the micro switches on the joystick.

For push button option games, each push button will also include a small incandescent bulb to provide back lighting. Power and drive control for these bulbs is supplied by the BP2000 controller board. Both bulbs will simultaneously flash off and then on when no credits are available for game play. When game credit is available, the bulbs will illuminate to tell the player which of the buttons can be pressed to play the game.

DOLLAR BILL ACCEPTOR

Purpose

The purpose of the dollar bill acceptor (DBA) is to allow the purchase of game play time with paper currency. The addition of a DBA to a game can significantly increase game profits.

Implementation and Operation of the Dollar Bill Acceptor

Implementation of the DBA in this game is very simple. The DBA is supplied with power from the component board, either with filtered 120 VAC or from the BP2000 controller board's regulated +12VDC supply, depending on the particular DBA used. Once powered, the DBA is ready to accept paper currency. If a particular piece of currency is accepted by the DBA, the DBA will send a series of pulses to the BP2000 controller board. The BP2000 controller board will then process these pulses and give appropriate credit for game play. The game does not give change once currency is accepted by the DBA. Credit will be returned only in the form of game play time.

COIN MECHANISM

Purpose and Electrical Composition of the Coin Mechanism

The coin mechanism allows the purchase of game play with coins or tokens. Electrically, the coin mechanism consists of the coin mechanism lights and the coin mechanism micro switches.

Coin Mechanism Lights

The coin mechanism lights provide back lighting for the reject buttons on the coin mechanism. This back lighting not only illuminates the reject buttons, but also supplies a visual attraction to direct the customer's attention to the game and to where their money should be inserted. Electrically, the coin mechanism lights are little more than incandescent bulbs. Power to light these bulbs is directly supplied by the BP2000 controller board's regulated +12 VDC supply. These bulbs will be illuminated at all times when the main power switch is on.

Coin Mechanism Micro Switches

After tokens or coins are inserted into the coin insert slots of the coin mechanism, they pass into the coin rejecter. If the coins or tokens are not of the appropriate size, they will be rejected by the coin rejecter and will end up in the coin reject slot of the coin mechanism. Coins or tokens of the appropriate size will pass through the rejecter and into the coin collection box.

After being accepted by the coin rejecter, coins or tokens will strike the bail of a micro switch on the coin mechanism, actuating the micro switch. The micro switches are electrically connected to the BP2000 controller board through the console/crane/prize harness. Actuation of the micro switch will change the state of an input on the BP2000 controller board. Circuitry on the BP2000 controller board will react by supplying appropriate credit to the customer for the coin or token insertion. The micro switches on the coin mechanism are all configured as "normally open" switches.

See the section Definitions of "Normally Open and Normally Closed" in the **Crane Head Assembly** sub-section of **Theory of Operation-Electrical** in this section of the manual for a description of the operation of the micro switches on the coin mechanism.

ROPE LIGHTS

The rope lights are located on the outside front corners of *Clean Sweep* and *Prize Time* Cranes only. These lights are composed of strings of bulbs connected in parallel and embedded in the molded plastic rope. The rope lights are powered through one of the main transformer's 12 VAC secondary windings, and are driven by the BP2000 controller board. These rope lights flash off and on to attract attention to the game. Individual bulbs cannot be replaced in these rope lights.

INTERNAL LIGHTING

The play field and prizes are illuminated by four fluorescent light bulbs in two fixtures mounted on the top light assembly on the roof of the game. These lights are controlled by ballasts internal to the light fixtures. Power for these lights is supplied directly from the AC outlet supplying the rest of the game. Power for the lights passes through the light switch and main power fuse on the component board. Contact your distributor or Smart Industries for pricing if a bulb or fixture must be replaced.

COMPONENT BOARD

Composition and Purpose

The component board consists of the BP2000 controller board, the light switch; the main power switch; the main power fuse; the EMI filter and its associated transient surge suppresser, the main transformer, its associated fuses, and the voltage selection adapter; the coin meter and prize meter; and all associated interconnect wiring. Control signals to and from the rest of the game all channel through the component board.

Light Switch

The light and the main 6-ampere fast blow fuse provide unfiltered AC power to the game's internal lighting system.

Main Power Switch

The main power switch and the main 6-ampere fast blow fuse provide AC power to the EMI filter and its associated transient surge suppresser.

EMI Filter and its associated Transient Surge Suppressor

EMI Filter

The EMI filter reduces electrical spikes and noise from the incoming AC power prior to passing the power line voltage to the rest of the component board circuitry. From the EMI filter, AC power is provided to the primary winding of the main transformer and to any 120 VAC dollar bill acceptor.

Transient Surge Suppressor

The transient surge suppresser, attached to the "hot" and "common" inputs on the 3 terminal side of the EMI filter, prevents severe surges or spikes across the AC power line from reaching and damaging the delicate electronics on the rest of the component board.

NOTE: The most severe surges — such as those due to lightning strikes — will cause the transient surge suppresser to short and lead to continued failure of the main power fuse. See the section titled "Troubleshooting" in this manual for more information on transient surge suppresser failures.

Main Transformer

The main transformer takes the relatively large AC voltage from the power outlet to which the machine is connected and creates three lower secondary voltages to power the BP2000 controller board. Each secondary winding of the main transformer is protected by its own fuse. These fuses protect the main transformer and BP2000 controller board from damage if too much current is drawn from any secondary winding.

The main transformer produces 25 VAC with one of its three secondary windings, and two 12 VAC outputs with the other two secondary windings. The 25 VAC output is rectified on the BP2000 controller board to produce about 32 VDC. This voltage is used by the BP2000 controller board to drive the crane head motors and the magnetic claw solenoid. One of the main transformer's two 12 VAC windings is used to provide power to the rope lights on the game. The other 12 VAC supply is rectified by the BP2000 controller board to produce about 16 VDC. This 16 VDC supply is then regulated by the BP2000 controller board to produce both a +12 VDC supply and a +5 VDC supply.

The Voltage Selection Adapter

The main transformer has a number of primary winding taps. By choosing the proper taps, the primary winding can be powered with 100 VAC, 120 VAC, 200 VAC, 220 VAC, or 240 VAC and still produce the desired secondary voltages. Once a given input supply voltage is known, a voltage selection adapter can be chosen to allow this voltage to produce the correct secondary voltages. Each adapter is color-coded to allow immediate distinction of the voltage selection adapter in use. The standard CS game uses the 120 VAC voltage selection adapter with yellow wires; contact your distributor or Smart Industries if a different voltage selection adapter is needed.

NOTE: If a voltage other than 120 VAC is used to operate a CS Crane, the light ballasts in the overhead fluorescent lights will need to be changed to insure proper operation of those lights. A transformer may also be needed to provide power to any dollar bill acceptor powered by the main AC supply if the voltage required by the dollar bill acceptor is different from the main AC supply voltage.

The Coin Meter and Prize Meter

Coin Meter

The coin meter counts all money accepted by the coin mechanism or DBA. The number shown on the coin meter will be referenced to the lowest valued coin the game is capable of accepting.

Example: A game has a coin mechanism to accept quarters and \$1 coins. The game also has a DBA to accept \$1, \$2, and \$5 bills. Because a quarter is the smallest coin value accepted by the game, every quarter accepted by the coin mechanism will give 1 count on the coin meter. Every dollar coin inserted into the game will then put 4 counts on the coin meter. Likewise, a \$1, \$2, or \$5 bill accepted by the DBA will give 4, 8, and 20 counts, respectively, on the coin meter.

The coin meter will not count any bonus games given.

Prize Meter

The prize meter counts the number of games in which a prize has been dispensed at the end of the game. The prize meter will only give one count per game. Because only one count will occur for each game, multiple prizes won during any game will only give one count on the prize meter.

BP2000 SYSTEM HARDWARE DESCRIPTION

The BP2000 controller board controls all operational aspects of the game. Every input — from the joystick or push buttons, the coin mechanism, the dollar bill acceptor, the prize detecting assemblies, the crane head limit switches, or from any optional device within the game — is channeled to the BP2000 controller for processing. The cost of each game, the style of play allowed, the manner of crane head movement and game play, sound production, display information, claw strength control, termination of game play, as well as a number of other aspects of game operation, are all controlled — based on the game inputs — by the BP2000 controller board.

Output Protection and Failure Indicators

To provide reliable, problem free operation, the BP2000 Smart Industries crane controller board is designed to be as robust as possible. The motor drivers, U14, U15, and U16, have built in over-current and over-temperature protection circuitry, preventing damage to the BP2000 controller board hardware should a motor failure occur. The claw solenoid driver, U18, also has built-in maximum-current and over-temperature protection.

Further Circuit Protection

Protection of other circuitry on the board is accomplished through the use of self-restoring polymer fuses. Excessive current through these devices will cause them to heat and stop current flow. Since these devices are self-restoring, they do not need to be replaced when open, unlike a simple fuse. If these devices are allowed to cool, they will again allow current to flow through them. These protection devices prevent the failure of external devices connected to the BP2000 controller board from damaging other circuitry on the BP2000 controller board.

The rope light drivers — Q1, Q2, Q3, and Q4 — are individually fused with 2.5A self-restoring polymer fuses — F2, F3, F4, and F5, respectively. The +5 VDC power output — at pin 1 and pin 2 of connector JP8 — for the prize detector and display PCBs is fused with a .65A self-restoring polymer fuse. The +12 VDC power output for the dollar bill acceptor, provided at pin 3 of connector JP8, is fused with a .65A self-restoring polymer fuse. The +12 VDC power output for the card dispenser and photoeye — at pin 4 and pin 5, respectively, of connector JP8 — is fused with a .65A self-restoring polymer fuse. The +16 VDC power output for the coin and prize meters and any other accessories — from pin 10 and pin 11 of connector JP3 — is fused with a .65A self-restoring polymer fuse.

Operational Indicator LEDs.

For ease of service, an LED indicator is present for every output. In fact, for the motor outputs, a bicolor (green and red) LED indicates the motor direction as well as whether the motor is on or off. Also, each motor has an on-board LED indicator for failure identification. The solenoid driver also has an output indicator as well as a failure indicator.

The Controlling Microprocessor

The "brain" of the BP2000 controller board is an Atmel 89C55 microcomputer, U1. All instructions for controlling the game are contained on the microcomputer IC within 20K of ROM internal to this IC. This ROM is factory programmed. This processor is mounted in a socket for ease in replacement should updates to the program or custom software be needed. Also included on the microcomputer are 256 bytes of internal RAM.

The microcomputer controls all aspects of operation of the crane. The status of the game settings DIP switches, coin switches, DBA pulses, joystick switches, the on-board audit/test switch, motor limit switches, prize detector pulses, and any information provided to the two spare inputs are presented as serial data to the microcomputer via a shift register group comprised of ICs U3, U5, U9, U10, and U12. The inputs are loaded into the shift registers and clocked into the proper microcomputer port under control of the microcomputer. Resistor packages are used to passively pull all these inputs to Vcc, presenting a high logic signal to the inputs of the shift registers; actuation of the inputs must drive these signals to ground level to present a low logic signal to the inputs of the shift registers.

Motor direction, speed, and braking are controlled through the microcomputer's output ports. These ports connect directly to the motor driver ICs — U14, U15, and U16 — and the solenoid driver IC, U18.

Clock Signal Generation

The clock signal for the microcomputer is produced by a 24 MHz oscillator crystal, Y1.

Non-Volatile Memory

Game statistics and soft options are stored in a non-volatile memory. This memory is a Flash EEPROM device, U4, and has a serial interface to the microcomputer.

Reset and Voltage Monitoring

A DS1232 device, U11, generates the system reset signal at power-on and whenever the +5V supply is not within its specified range.

Monitoring of Microcomputer Operation

Software execution is detected by monitoring the SCLK signal from pin 8 of the microcomputer. If the SCLK signal is not presented to U11 on a regular basis, U11 will generate a "watchdog" reset, restarting operation of the microcomputer.

Manual Reset Control

U11 can also cause a reset via the board-mounted reset switch. Momentary contact switch S4 is the BP2000 "Reset" switch, and is located next to the square IC socket (holding the BP2000 microcomputer) near the center of the BP2000 controller board. Pressing this switch will cause U11 to issue a reset signal to pin 10 of the microcomputer. This allows resetting of the main controller board without the need to remove power from the entire game.

DIP Switch Game Control

Three banks of eight 2-position DIP switches (S2, S3, and S5) allow game settings on the board. These switches control many of the basic game parameters, such as the game type, the game play style, the number of coins needed for game play, the maximum game play time, and enabling of the factory burn in mode, as well as a number of customer-specific options and other basic functions. Specific information on DIP switch settings is provided in the Game Adjustments section of this manual.

Software-Based Game Setup and Control

Additional control of the operation of the game is provided through software control. Software settings allow more control options than can be provided by a small number of DIP switches. The controllable parameters include separate control of each coin mechanism, adjustment of claw strength, rope light flash speed, and provisions for providing bonus credits for consecutively purchased games, as well as certain game-specific options. The software settings mode is entered by pressing the Audit/Test button, S1, on the BP2000 controller board. Specific information on the various software game settings is provided in the Game Adjustments section of this manual. The software game settings can vary from game to game, depending on the needs of the customer.

Software-Based Audits and Test Modes

As the name implies, the Audit/Test button also allows access to audit information and a game test section. Software-based audits provide the operator with back-up information to verify the coin meter readings. The test section allows the operator to insure correct operation of the game. The test section has been specially designed to allow testing of the coin and DBA inputs without affecting the game's meters or audit information. Specific information on the various audits and tests available is provided in the Game Adjustments section of this manual.

Claw Strength Control

With the exception of games manufactured for sale in the state of California, the strength of the magnetic claw is controlled through the claw strength potentiometer (R38), located about 1 inch from connector JP1 along the edge of the BP2000 controller board. The claw strength potentiometer value is read into the microcomputer via an analog to digital converter U21 - a serial device under microcomputer control. After reading the potentiometer setting, the microcomputer outputs the digital claw value to a digital-to-analog converter, U20, which is connected to the solenoid driver, U18. The analog voltage output from U20 is used by the coil driver to set the coil current that operates the claw.

The coil driver is enabled by the signal SOLND0 (active low) from the microcomputer. The signal SOLND1 is used to set the claw strength to full to turn on the coil fast, independent of the digital-to-analog converter voltage.

See the section in this manual titled "Game Adjustments" for detailed information on adjusting the magnetic claw strength.

NOTE: Some jurisdictions do not allow potentiometer-based adjustment of the coil voltage. In such locations, R38 can be removed. Two fixed resistors can then be chosen to provide a fixed setting for the claw strength. These fixed resistors will replace resistors R33 and R34 on the BP2000 controller. Remove R33 and R34 and replace these resistors with the chosen fixed resistor pair.

Credit/Timer Drive

Control signals for the serial interface to the credit/timer display come from the microcomputer and are buffered by U2, a 7407 non-inverting buffer driver. The serial outputs consist of a clock, a strobe and a data signal, and send information to the credit/timer display. All display decoding and driving circuitry is located on the display board. The credit/timer display shows the software version at game power-up, displays game credit and game time during game play, and displays setting and data information in the game settings and audit and test modes.

Card Dispenser/Value-Added Option Drive

IC U2 is also used to provide a drive signal for a card dispenser or other value-added option (such as a bulk vendor or gum ball dispenser). These devices are used in jurisdictions requiring customers to receive some form of merchandise for money inserted into the game. A DIP switch on the BP2000 controller board must be set to inform the microcomputer such a device has been installed on the game. The software game settings mode allows control of the number of items that will be dispensed for every game purchased by the customer.

Please refer to the "Game Adjustments" section of this manual for more information on DIP switch settings and game software settings.

Meter and Rope Light Drive

Drive signals for the coin and prize meters, any devices connected to the spare output pin, and rope light outputs are provided via a serial device, U8, which is also a driver IC. The coin and prize meters are driven directly by the IC. The outputs provided for the rope lights from U8 drive optically isolated triacs that turn on the triac drivers for the AC-operated rope light strings.

Sound Production and Control

U6 — a voice and sound synthesis IC controlled by the microcomputer — creates sound on command via a serial interface. Specific sound synthesis data is stored in EPROM U7. EPROM U7 is installed in a DIP socket to ease replacement if game-specific sound information is needed. The sound signals produced by U8 are delivered to audio amplifier U13. After amplification, the sound signal is passed to the game's speaker.

Volume control

The sound volume can be controlled with the volume control potentiometer. The volume control potentiometer (R4, labeled "Volume") is located about halfway between the square IC socket (holding the BP2000 microcomputer) and the DIP switches on the BP2000 controller board. Turning the volume control potentiometer knob clockwise or counter clockwise will increase or decrease, respectively, the volume of the sound from the game speaker.

Power Supply Generation and Distribution

Power for the BP2000 controller board is provided by the main transformer, located on the component board assembly. This transformer provides three AC voltages to the BP2000 controller board.

Motor and Solenoid Voltage

Power for the motors and solenoid is derived from the 25 VAC secondary winding of the main transformer. This 25 VAC is converted to +32 VDC on the BP2000 controller board by bridge rectifier D4 and a filter network consisting of capacitors C15 and C17.

Rope Light Voltage

Power for the rope lights on the game is provided by one of two 12 VAC secondary windings on the main transformer. Triacs are switched off and on by the BP2000 controller board's rope light drive circuitry to control when power from the 12 VAC rope light supply is provided to the rope lights.

DC Voltage for the BP2000 Controller Board

The second 12 VAC winding of the main transformer is used to provide DC power to circuitry on the BP2000 controller board and to power — through the BP2000 controller board — external devices requiring a DC power supply.

+16 VDC Production and Distribution

The 12 VAC voltage from the main transformer is first rectified by bridge rectifier D5 and filtered by a network composed of capacitors C20, C21, and C22. Power for the coin and prize meters is provided by this unregulated +16 VDC supply.

+12 VDC Production and Distribution

Part of the +16 VDC supply is regulated to +12 VDC by U17 and an output filter network consisting of capacitors C45, C46, and C47. The regulated +12 VDC supply is used off-board for the coin door, dollar bill acceptor, card dispenser, and photoeye.

+5 VDC Production and Distribution

Another part of the +16 VDC supply is regulated to +5 VDC by U19 and an output filter network consisting of C48, C49, and C50. The +5 VDC supply is used on-board for all logic circuitry. It also supplies off-board power for the credit/timer display and the prize detection assemblies.

CREDIT / TIMER BOARD

Purpose

The credit/timer display shows customers the number of games available for play and the amount of time remaining for play during any given game. The credit/timer display also shows the version number of the software controlling the BP2000 controller board at the start of controller board reset, and shows information on the software setting number and software setting value, audit number and audit value, and test number and test information in the Audit/Test mode.

Visual Operation of the Credit/Timer Display

During No Credit/Idle Periods:

With no credits available for game play, the credit display (the upper two 7-segment LEDs) will show "00," indicating that no credits are available for game play. The timer display (the lower two 7-segment LEDs) will show the full amount of time available for play of any game.

At Game Start:

At the start of any game, the credit display will show the number of games available for play, including the current game. The timer display will continue to show the full amount of time available for play.

During Game Play:

Once game play begins, the number that had been shown on the credit display will be reduced by one count, and the timer display will show the number of seconds left until the conclusion of the present game. The time on the display will decrease until either one of two situations occur:

1. The magnetic claw opens over the prize box at the end of a game. (If the claw reaches the "home" position over the prize box with time still left on the timer display, the time shown will not change until the prize detection period has ended. At that point, the timer display will again show the full amount of time available for play.)
2. The amount of time on the timer display reaches "00". At that point, the magnetic claw automatically drops, rises, and returns to the "home" position over the prize box.

Power Supply and Input Information

The credit/timer display receives five signals from the BP2000 controller board. These five are +5VDC, ground, clock, data, and strobe. The +5VDC line provides power to drive the electronic circuitry and LEDs on the credit/timer board. Ground is the common DC line for the +5VDC supply and for the other three signal lines. The clock, data, and strobe lines provide serial information to the credit/timer display to control illumination of the LED segments on that display.

PRIZE DETECTOR ASSEMBLY, CS/BC/PT

Purpose

The purpose of the Prize Detector Assembly is to observe the opening into the prize box and send a signal to the BP2000 controller board if a prize passes through this opening

Composition of the Light Curtain/Prize Detector Assembly

The Prize Detector Assembly uses a number of identical PCB modules to create a series of light ray paths covering the upper opening of the prize box. Each board has a transmitting infrared LED, a receiving photo transistor, and an indicator LED. Each assembly must be aligned with the other assembly on the opposite side of the prize box in order for the system to work properly. The indicator LEDs, visible on the back side of the each assembly, will be illuminated if any of the light ray paths are broken; this LED will also illuminate if either assembly is out of alignment.

Supply Voltage for the Assembly

The supply voltage for the electronic circuitry on the light curtain modules is provided by the regulated +5 VDC voltage from the BP2000 controller board.

Alignment of the Assemblies

To align the light curtain assemblies, move each assembly forward or backward until all the indicator LEDs are extinguished

Basic Operation

Each transmitting infrared LED sends its ray path to a receiving photo transistor on a PCB module on the opposing side of the prize box. The receiving photo transistor is normally on because of the light being received from its opposing transmitting infrared LED. If a prize falling through the light curtain into the prize box blocks a ray path from a transmitting LED to a receiving photo transistor, the photo transistor will turn off. This leads to a change in the status of the output signal, which is processed by the BP2000 controller board.

Design of Circuitry to Prevent False Triggering

To reduce the possibility of ambient light triggering the receiving LED, the output of the IR transmitting LED is modulated at approximately 10 kHz. This is accomplished by driving the transmitting LED with the output from pin 3 of U4; U4 is a 555 timer IC and is used as part of a self-oscillating circuit in this application. The frequency of oscillation is controlled by R13 - a 1 kohm resistor, R16 - a 33 kohm resistor, and C3 - a 0.0022 uF capacitor. The receiving circuit is designed to respond not only to the light output of the IR LED, but also to the particular modulation frequency.

Reference Voltage Production

Two reference voltages for the comparator IC's on the modules are required. The first reference voltage, REF1, is produced by R9, a 15 kohm resistor, and R4, a 10 kohm resistor. This combination produces a reference voltage 0.4 times the power supply voltage of +5V, or about 2V. The second reference voltage, REF2, is produced by R6 and R7, both 10 kohm resistors. This voltage is 0.5 times the power supply voltage, or about 2.5V

Detailed Operation of the Prize Detector Module

Capturing the occurrence of a prize passing through the prize box opening

D1, the receiving photo-transistor, receives the modulated IR signal from a transmitting IR LED on an opposing board. The collector of D1 is tied to the +5V supply via R1, a 5.1 kohm resistor. If D1 turns off due to blockage of the ray path from its transmitting LED, the collector voltage of D1 will rise to near the +5V supply voltage.

Triggering of the first comparator stage

The collector output of D1 is passed through a filter network composed of R2, a 3.3 kohm resistor, and C1, a 0.0022 uF capacitor, to the inverting input (pin 2) of U2A, one comparator on U2, an MC3403 quad 2-input operational amplifier (op-amp) IC. The non-inverting input on pin 3 of U2A is tied to the REF1 voltage. R3, an 82 kohm resistor, provides feedback to prevent the output from pin 1 of U2A from oscillating. A change in the collector voltage of D1 (due to the ray path to D1 being broken) will be coupled to the non-inverting input of U2A and will cause the voltage at the inverting input to become greater than the voltage on the non-inverting input. The output of U2A will then transition from a high (+5 volt) level to a low (approximately 0 volt) level.

Triggering of the second comparator stage

The output of U2A on pin 1 of U2 is fed directly to pin 5 of U3A, the non-inverting input of one comparator of IC U3, an LM339 quad 2-input comparator IC. The second input to U3A is the REF2 voltage. The output of U3A on pin 2 of U3 is passively tied to the +5V supply via R10, a 510 ohm resistor. If the output on pin 1 of U2 falls because the ray path to D1 is blocked, the voltage on pin 5 of U3A will also fall. Once the voltage on pin 5 falls to less than the REF2 voltage on pin 4, the output of U3A will fall from a high level to a low level.

Triggering of the third comparator stage

The output of U3A on pin 2 of U3 is connected to pin 7 of U3B, the non-inverting input of another comparator on the LM339 IC, via a filter network composed of D2 - a 1N4148 diode, C2 - a 0.0022 uF capacitor, and R11 - a 100 kohm resistor. The inverting input of U3B is tied to the REF2 voltage. The output of U3B on pin 1 of U3 is passively tied to the +5V supply via R12, a 1 kohm resistor. Yet again, if the output on pin 2 of U3A falls because the ray path to D1 is blocked, the voltage on pin 7 of U3B will also fall. Once the voltage on pin 7 falls to less than the REF2 voltage on pin 4, the output of U3A will fall from a high level to a low level.

Driving of the indicator LED and the output signal

The output on pin 1 of U3B is fed to two other comparators on IC U3. The output of one of the comparators, U3C, controls the state of the indicator LED D3 through R14. The output of the other comparator is passively tied to the +5V supply by R5, a 10 kohm resistor. This particular output drives the output signal of the prize detector assembly.

Driving the indicator LED

Pin 9, the non-inverting input of U3C, is tied to the output from pin 1 of U3B; the inverting input on pin 8 of U3C is tied to the REF2 voltage. If the output on pin 1 of U3B falls to a low level due to blockage of the ray path to D1, the input on pin 9 of U3C (the non-inverting input) will fall to a level less than the REF2 voltage, and the output at pin 14 of U3C will fall from a high level to a low level. This will allow current to pass through D3 - the indicator LED, and R14 - a 270 ohm resistor, leading to illumination of the indicator LED.

Driving the output signal

Pin 11, the non-inverting input of U3D, is also tied to the output from pin 1 of U3B; the inverting input on pin 10 of U3D is tied to the REF2 voltage. If the output on pin 1 of U3B falls to a low level due to blockage of the ray path to D1, the input on pin 11 of U3D (the non-inverting input) will fall to a level less than the REF2 voltage, and the output at pin 13 of U3C will fall from a high level to a low level. This signal is sent to circuitry on the BP2000 controller board. The BP2000 controller board software interprets this signal as an indication of an occurrence of a blockage of a ray path on the prize detector assembly.

BULK VENDOR/GUM BALL DISPENSER DRIVER BOARD (OPTIONAL)

Purpose

The bulk vendor/gum ball dispenser driver board allows a low voltage drive signal on the main controller board to control the rotation of a 110VAC motor on a bulk vendor or gum ball dispenser. It also allows only one single dispense from the bulk vendor or gum ball dispenser per pulse from the main controller board.

Board input and output signals

Power signals:

The circuitry on the bulk vendor/gum ball dispenser driver board requires a +12VDC supply and a ground connection. The board also connects to the AC common terminal and to the AC line leading to the bulk vendor or gum ball dispenser motor; the other connection on the motor will connect to the AC hot terminal.

Input signals:

The board receives two external input signals: A control pulse from the main controller board in order to initiate a dispensation, and a feedback signal via a micro switch actuated by a cam on the bulk vendor or gum ball dispenser motor to stop the dispense cycle.

Output signal:

The bulk vendor/gum ball dispenser driver board provides one main output: A controlled AC voltage to drive the bulk vendor or gum ball dispenser motor.

Board Circuitry

The circuitry on the bulk vendor/gum ball dispenser driver board can be divided into four major sections: The reset/drive disable circuitry, the input trigger circuitry, the motor drive control circuitry, and the motor drive circuitry.

The reset/drive disable circuitry:

The voltage across C3 (a 10-uF capacitor) and R2 (a 220-kohm resistor) controls circuit operation at game power-up. When the game is turned on, C3 will be discharged and will present a low signal to the input on pin 13 of one NAND gate input of IC1 and on pin 1 of a second NAND gate on the same IC. Until C3 charges to the supply voltage through R2, both gate inputs will be held low, and the gates will not be able to respond to changes at the other gate inputs. After C3 charges through R2, the voltage at the pin 13 and pin 1 inputs will be high. This enables the other gate inputs, allowing the rest of the board circuitry to respond to changes at those inputs. Such reset control prevents noise and power-up transients occurring when the game is turned on from causing the bulk vendor or gum ball dispenser from dispensing an item.

The input trigger circuitry:

The trigger signal from the main controller board controls the inputs at pins 8 and 9 of one NAND gate on IC1. Pins 8 and 9 are connected together, causing the NAND gate to act as a simple inverter. R8 is a 0-ohm jumper to connect the input signal from the main controller board to the NAND gate inputs. Since the drive controller on the main controller board is an open collector device, R1 (a 1-kohm resistor) serves as a pull-up resistor to pull the inputs to the NAND gate high until the drive signal on the main controller board pulls the inputs low. Pin 10 on IC1 is the output corresponding to input pins 8 and 9. With the inputs at pins 8 and 9 normally high, the output at pin 10 will be normally low. When the drive signal on the main controller board pulls these inputs low, the output at pin 10 will be driven high.

The motor drive control circuitry.

The motor drive control circuitry can be subdivided further into four main sections: The input trigger controller, the dispense initiation timing controller, the dispense initiation drive controller, and the completed dispense drive controller.

INPUT TRIGGER CONTROLLER

The output signal from the input trigger circuitry (pin 10 of IC1) serves as the control input at pin 12 of a NAND gate on IC1. Once the input on pin 12 is enabled after power-up reset (with the other input at pin 13 always high), the output of this gate (pin 11 of IC1) will be always be a logical inverse of the input on pin 12. The signal on pin 11 of IC1 is used to trigger the dispense initiation timing controller.

DISPENSE INITIATION TIMING CONTROLLER

The dispense initiation timing controller is based around a 555 timer configured as a one-shot device. Timing of the output signal is controlled by capacitor C4 (0.1-uF) and resistor R4 (100-kohms). R3 serves as a pull-up resistor for the trigger input at pin 2 of the timer. This resistor pulls the input at pin 2 high until the input trigger controller signal at pin 11 of IC1 drops low. Once the input trigger signal at pin 2 of the timer is pulled low, C4 -- which was held low by pin 7 of the timer -- will begin to charge through R4. This will also cause the output of the timer (pin 3) to rise high. Once the voltage across C4 -- and hence at pin 6 of the timer IC -- reaches 2/3 of the supply voltage, the timer will be reset and pin 7 will again pull the voltage across C4 low. This will cause the timer output voltage at pin 3 of the timer to fall low. At this point, the timer is ready to respond to another trigger signal at pin 2.

Capacitor C5 (0.1-uF) serves as a filtering capacitor to filter transient surges from and to the +12VDC power supply for the timer.

DISPENSE INITIATION DRIVE CONTROLLER

The output signal from pin 3 of the timer serves as one input (at pin 2) to yet another NAND gate on IC1. After power-up reset, the input at pin 2 of this NAND gate will be enabled (since the input at pin 1 will be held continuously high). With the input at pin 1 of IC1 held high, the output of IC1 at pin 3 will be a logical inverse of the input to the NAND gate at pin 2 of IC1.

Based on the previous discussions of the circuitry on the bulk vendor/gum ball dispenser driver board, it can be seen that the output at pin 3 of IC1 will be held normally high until a trigger signal is received from the main controller board. A trigger signal from the main controller board will cause this output at pin 3 of IC1 to fall low. The time that this signal is low will be controlled by the dispense initiation timing controller circuitry. When the output at pin 3 of IC1 falls low, it will allow current to flow through R5, the LED on the MOC3010 optoisolator, and D1. The discussion of the motor drive circuitry will show the current flow through the LED will allow the motor to begin turning.

COMPLETED DISPENSE DRIVE CONTROLLER:

The final part of the motor control circuitry is provided by the micro switch actuated by the cam on the bulk vendor or gum ball dispenser motor. After rotation of the motor begins, the cam on the motor will actuate the feedback micro switch. At this point, the dispense initiation control signal can be removed. The actuated micro switch will continue to allow current to flow through the LED on the MOC3010 optoisolator until the cam on the motor rotates far enough to release the micro switch. With neither the micro switch nor the dispense initiation drive controller signal present, current flow through the LED on the MOC3010 optoisolator will cease, and power to the motor will be removed.

Diode D1 serves as a blocking diode. This diode allows current to flow through the LED on the MOC3010 optoisolator when the output at pin 3 of IC1 falls low. During the time the micro switch is actuated, though, D1 prevents the micro switch from shorting the output at pin 3 of IC1 once this output rises high.

The motor drive circuitry:

The motor drive circuitry interfaces the low voltage signals on the bulk vendor/gum ball dispenser driver board with the AC motor control voltage. This interface is accomplished through IC3 (a MOC3010 optoisolator with triac output). The input to the optoisolator consists of an LED. When either the output of IC1 is low, or the control micro switch is actuated, current can flow through the LED between pins 1 and 2 of IC3. R5 limits the current that can flow through the LED. When current flows through the LED, it illuminates and light from the LED will strike the triac internal to IC3. This will cause the triac to turn on, allowing current to flow to the gate of IC4 (a 2N6071 triac). This current will cause IC4 to turn on and complete the current path for the bulk vendor or gum ball dispenser motor. Once current stops flowing through the LED, the triac in IC3 -- and triac IC4 -- will turn off, removing power from the vendor or dispenser motor and stopping its rotation.

Resistor R7 (100-ohm) and capacitor C7 (0.1- μ F) prevent surges from the vendor or dispenser motor at motor start and stop from damaging the triac IC4.

Board Filter Capacitors

Filtering of the +12VDC supply for the bulk vendor/gum ball dispenser motor is provided by two 0.1- μ F capacitors, C1 and C2.

SECTION FOUR:

PARTS LIST CATALOG

Recommended Operator Replacements Parts List

Recommended Spare Parts		
<u>Part Number</u>	<u>Quantity</u>	<u>Description</u>
60029	1	Idler Arm Spring
51331	10	7A Fuse Slow
50967	10	4A Fuse Slow
50939	10	3A Fuse Slow
51332	10	6A Fuse Fast
50142	1	Right Limit Switch
50142	1	Back Limit Switch
50142	2	Up Limit Micro Switch
50142	1	Left Limit Switch
50142	1	Forward Limit Switch
09387 and 50142	1	Down Limit Switch
50376	1	Joystick Micro Switch
60060	1	Coin/Prize Meter
51329	1	BP2000 CPU
90774	1	Grease, Valvoline PN=615, 14.1 Oz. Tube, Multipurpose (red)
13588	1	Motor w/Pins
60415	2	Joystick

The above lists shows all parts that may be replaced by a route operator.

The micro switches may be a duplicate part so it may not be necessary to keep more than one on hand

The Motor, Joystick, and CPU are parts that can be maintained by an area manager
It is recommended that the other parts should be on hand by every operator

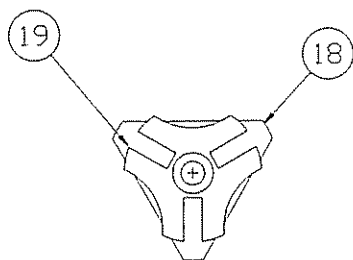
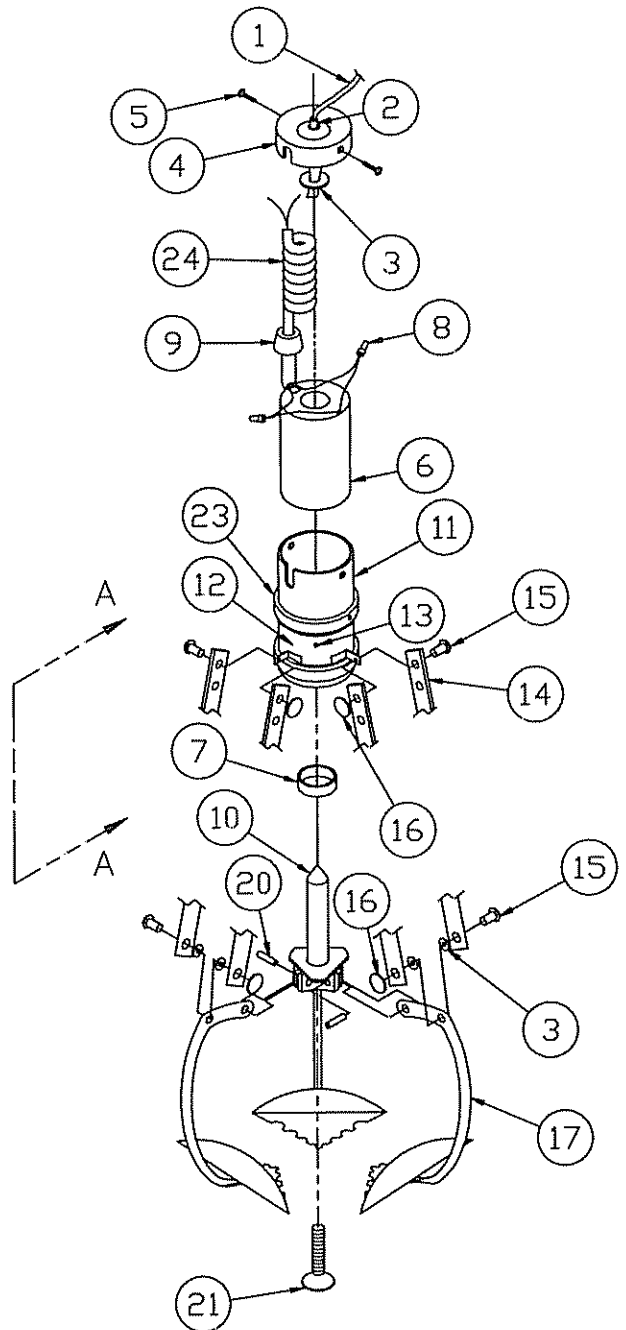
All parts and their availability are subject to change without notice.

ADJUSTABLE 24V CLAW ASSEMBLY, CC **PART NO. 12933**

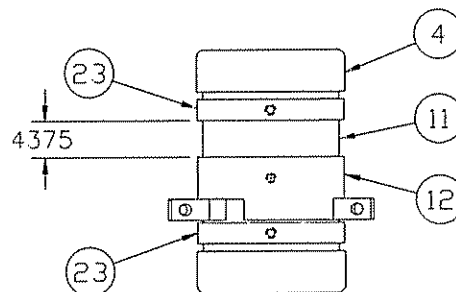
Item	Part Number	Description
1	70168	String, Nylon #2 3/4 White, 39"
2	60856	Bushing, Nylon 187 OD x 125 ID
3	60674	Washer, #6 x 5/16 Flat Nylon
4	09602	Cap, Top
5	60121	Screw, PPH #10 x 1/2 Zinc
6	51314	Assembly, Standard BP-2000 Coil 24V
7	10549	Ring, Claw Spacer
8	90071	Solder, 031 60/40 Chemaloy
9	60896	Strain Relief, Rubber
10	51353	Connector, Closed End Splice 22-18 GA
11	10404	Assembly, Coil Housing
12	10059	Slide, Adjustable Claw Large
13	61042	Screw, Set 4-40 x 1/8 Cup Point Black
14	00100	Retainer, Claw Finger
15	13110	Shaft, Claw Pivot Upper W/O Washer
16	60037	Washer, Lock 3MM Starlock W/SST Cap
17	05813	Finger, Claw Small
18	09761	Washer, Adjustment Large
19	00097	Spider, Claw Retainer
20	60964	Pin, Roll 1/8 x 1/2 SS
21	60317	Screw, MS PFH 10-32 x 1-1/4 zinc
22	90569	Adhesive, Loctite Purple
23	10842	Ring, Adjustable
24	70647	Wire, Retractable Cord 2-Cond 23 GA Black 48"

Notes:

- 1) Tin bare ends of item # 24 with item # 25
- 2) Apply item # 22 sparingly to item # 21



Watch Crane



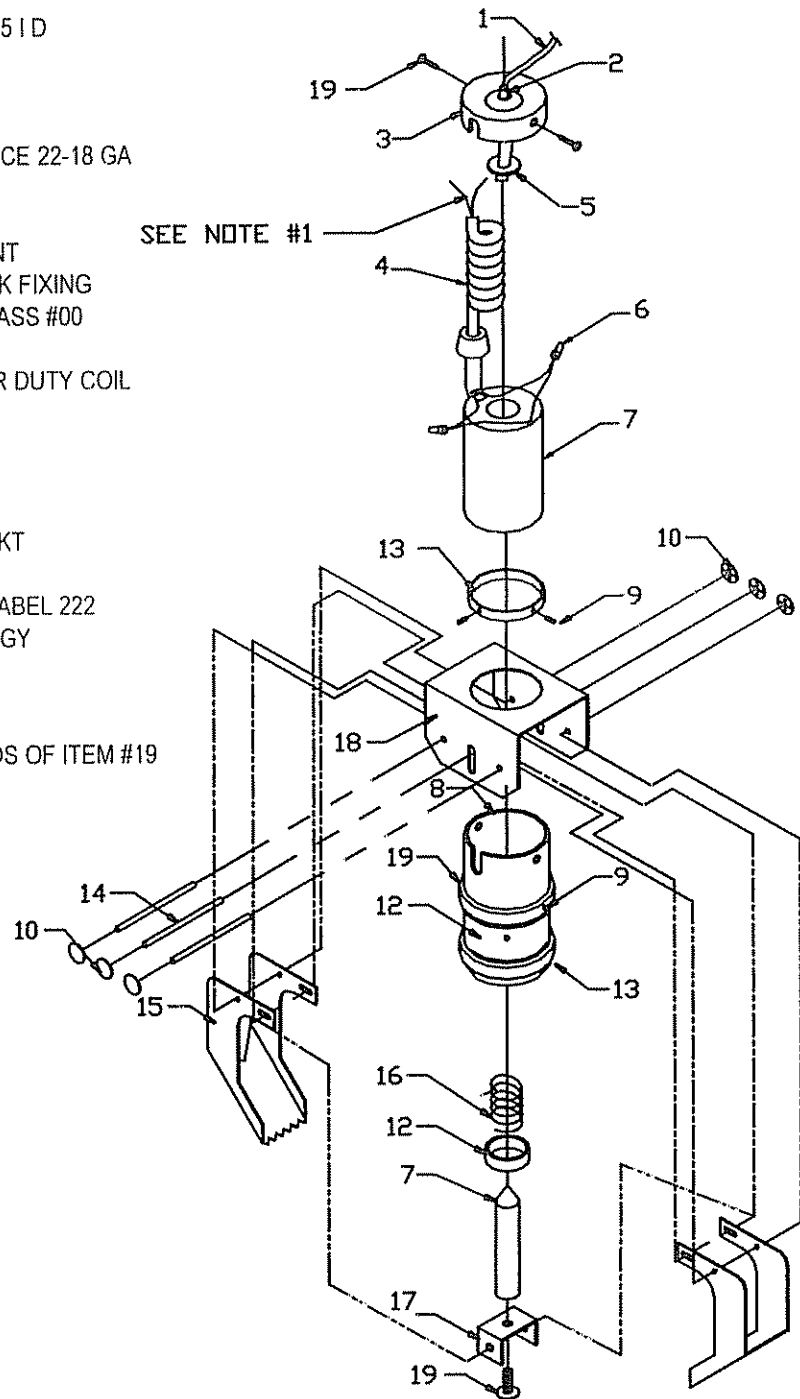
VIEW A-A

ADJUSTABLE 24V 2 SCOOP CLAW ASSEMBLY, CANDY CRANE / PC4 PART NO. 16222

GAME	COILWIRE	STRING LENGTH	KNOT
BEAR CLAW	9"	48"	29"
CLEAN SWEEP	9"	50"	30.5"
PRIZE TIME	9"	48"	29"

ITEM	QTY	P/N	DESCRIPTION
1	0	70168	STRING, NYLON #2 3/4 WHITE
2	1	60856	BUSHING, NYLON 187 OD X .125 I D
3	1	09602	CAP, TOP CS60
4	1	04418	ASSY, CORD COIL 15"
5	1	10760	WASHER, CLAW SPRING, CS
6	2	51353	CONNECTOR, CLOSE END SPLICE 22-18 GA
7	1	51314	ASSY, BP-2000 STD COIL 24V
8	1	10404	ASSY, COIL HOUSING CRANES
9	4	61042	SCREW, SET 4-40x1/8 CUP POINT
10	6	60037	WASHER, LOCK 3MM STARLOCK FIXING
11	1	60384	GROMMET & WASHER, 5/32 BRASS #00
12	1	10549	RING, CLAW SPACER
13	2	10842	RING, ADJUSTABLE FOR SUPER DUTY COIL
14	3	13963	PIN, CLAW, KT
15	2	16176	SCOOP, CLAWS, PC4
16	1	60986	SPRING, LARGE CLAW ASSY
17	1	13962	BRACKET, PLUNGER, KT
18	1	14634	BRACKET, SCOOP MOUNT, RM/KT
19	2	60121	SCREW, PPH 10x1/2 ZINC
20	0	90569	ADHESIVE, LOCTITE PURPLE LABEL 222
21	0	90071	SOLDER, .031" 60/40 CHEMOLGY

NOTES: 1) TIN BARE ENDS OF ITEM #4 WITH ITEM #21
2) APPLY ITEM #20 SPARINGLY TO THE THREADS OF ITEM #19
3) CHECK AND ADJUST BENDS AS REQUIRED



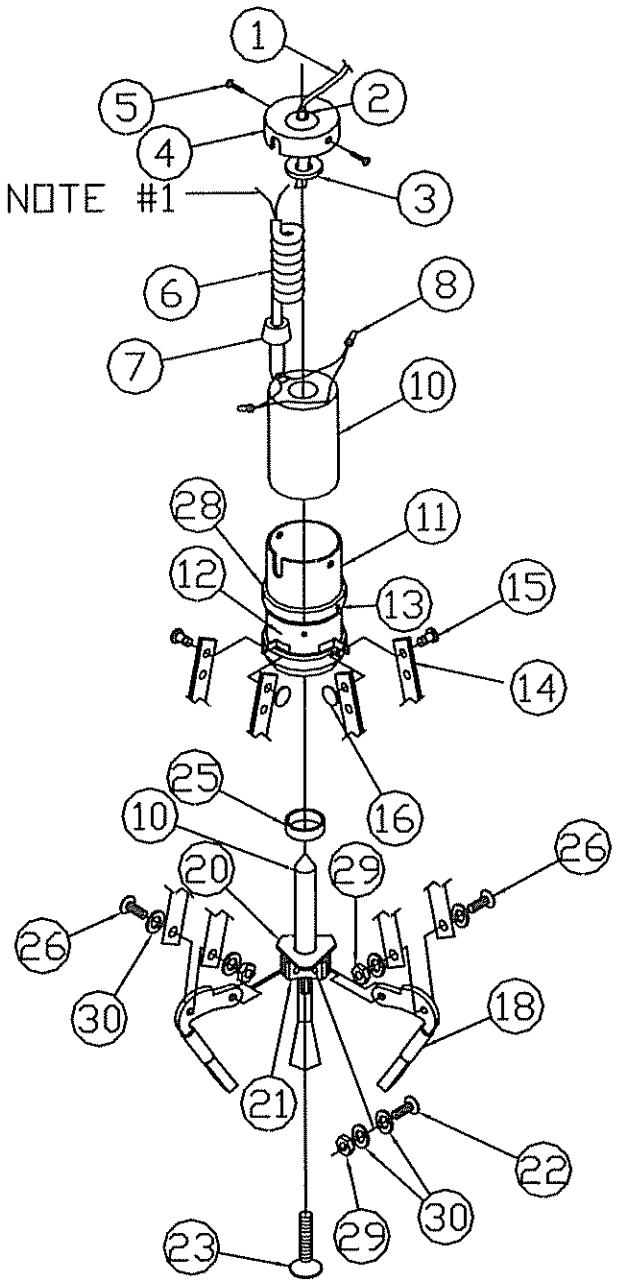
ADJUSTABLE 24V CLAW ASSEMBLY, CHOCOLATE CRANE PART NO. 14703

NOTES;

- 1) TIN BARE ENDS OF ITEM #6 WITH ITEM #9
- 2) APPLY ITEM #24 SPARINGLY TO ITEM #23.
- 3) WITH PLUNGER IN FULLY RETRACTED POSITION,
ADJUST ITEM #12 TO ALLOW FINGER TIPS TO CLOSE
- 4) WITH PLUNGER IN FULLY EXTENDED POSITION, ROTATE
ITEM #20 TO ADJUST CLAW OPENING TO MINIMUM OPENING

ITEM	QTY	P/N	DESCRIPTION
1	0	70168	STRING, NYLON #2 3/4 WHITE
2	1	60856	BUSHING, NYLON 187 OD X 125 I D 234 HIGH
3	1	60674	WASHER, #6x5/16 FLAT NYLON
4	1	09602	CAP, TOP CS60
5	2	60121	SCREW, PPH 10x1/2 ZINC
6	11	70647	WIRE, RETRAC CORD 2-COND 23GA BLACK 48"
7	1	60896	STRAIN RELIEF, RUBBER
8	2	51353	CONNECTOR, CLOSE END SPLICE 22-18 GA
9	0	90071	SOLDER, .031" 60/40 CHEMOLGY
10	1	51314	ASSY, BP-2000 STD COIL 24V
11	1	10404	ASSY, COIL HOUSING CRANES
12	1	10059	SLIDE, ADJUSTABLE CLAW LARGE
13	4	61042	SCREW, SET 4-40x1/8 CUP POINT
14	6	03970	RETAINER, CLAW FINGER JUMBO
15	3	13110	SHAFT, CLAW PIVOT UPPER W/O WASHERS
16	3	60037	WASHER, LOCK 3MM STARLOCK FIXING
18	3	14700	FINGER CLAW, CHOCOLATE CRANE
20	1	14701	WASHER, TRIANGULAR, CHOC CR
21	1	14702	SPIDER, CLAW RETAINER, CHOC CRANE
22	3	60984	SCREW, PPH 4-40x5/8 ZINC
23	1	60317	SCREW, MS PHIL FLAT HD 10-32 X 1-1/4 ZINC
24	0	90569	ADHESIVE, LOCTITE PURPLE LABEL 222
25	1	10549	RING, CLAW SPACER
26	3	60110	SCREW, MS PHIL PAN HD 4-40 X 1/2 ZINC
28	2	10842	RING ADJUSTABLE FOR SUPER DUTY COIL
29	6	60109	NUT, LOCK 4-40 NYLON INSERT
30	12	60011	WASHER, FLAT #4 ZINC

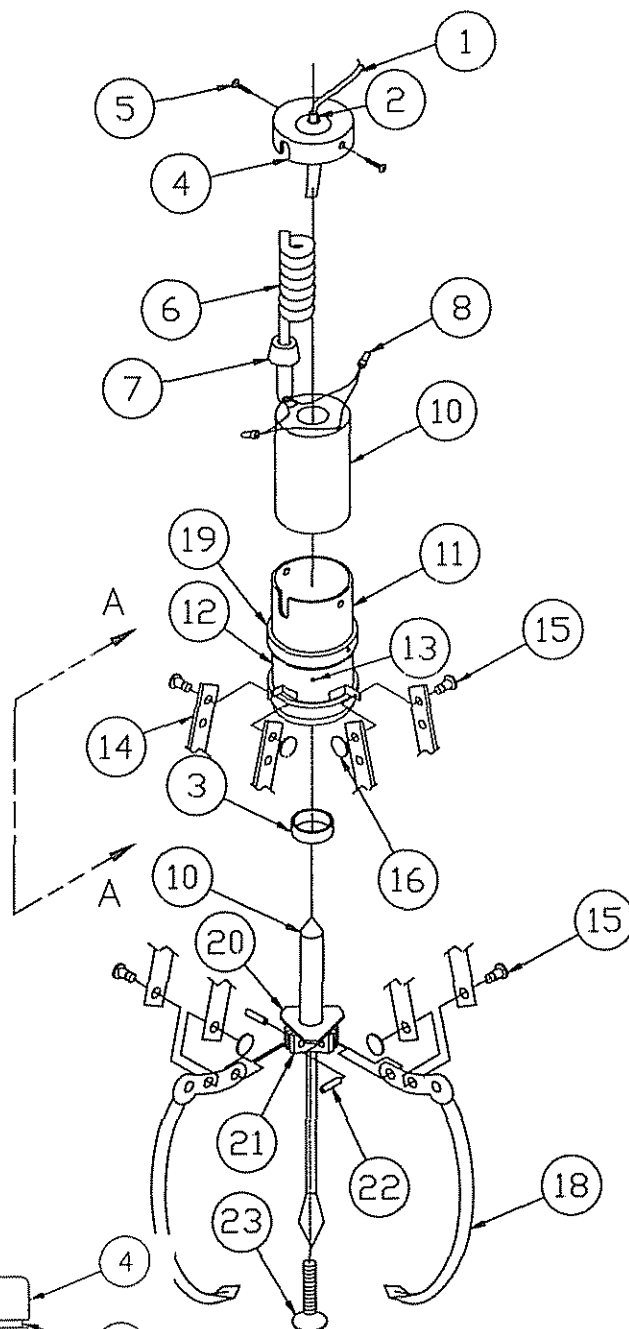
SEE NOTE #1



ADJUSTABLE SMALL CLAW ASSEMBLY, BB

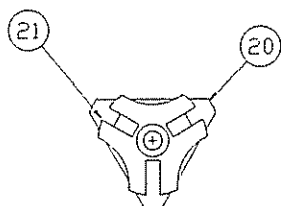
PART NO. 13804

Item	Part Number	Description
1	70168	String, nylon #2 3/4 white, 39"
2	60856	Bushing, nylon 187 OD x 125 ID
3	10549	Ring, Claw Spacer
4	09602	Cap, top
5	60121	Screw, pph #10 x 1/2 zinc
6	70647	Wire, retrac cord 2-cond 23 ga black
7	60896	Strain relief, rubber
8	51353	Connector, CL End 22-18GA
9	90071	Solder
10	51314	Assembly, standard BP-2000 coil 24V
11	10404	Assembly, coil housing
12	10059	Slide, adjustable claw large
13	61042	Screw, set 4-40 X 1/8 cup point black
14	03970	Retainer, claw finger
15	13110	Shaft, Claw Pivot Upper W/O Washer
16	60037	Washer, Lock 3MM Starlock W/SST Cap
17	90569	Adhesive, Loctite Purple
18	05310	Finger, claw small
19	10842	Ring, Adjustable
20	09761	Washer, adjustment large
21	00097	Spider, claw retainer
22	60964	Pin, roll 1/8 x 1/2 ss
23	60317	Screw, ms pph #10-32 x 1-1/4 Zinc

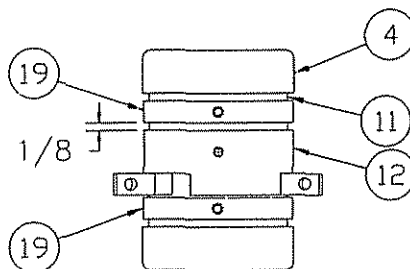


Notes:

- 1) Tin bare ends of item #6 with item #9
- 2) Claw opening 5"
- 3) Apply item #24 sparingly to item #23



Watch Crane

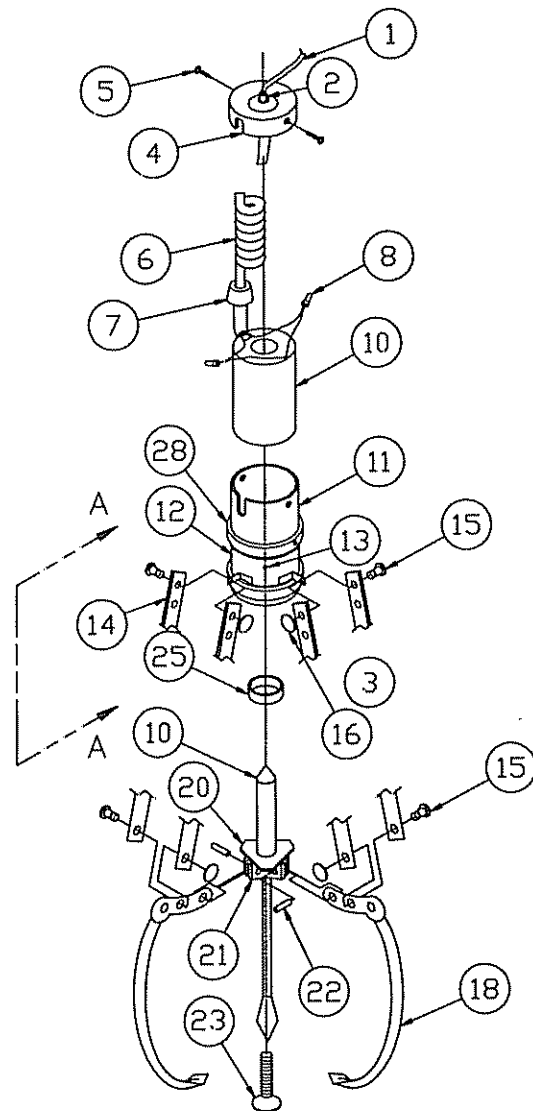


VIEW A-A

ADJUSTABLE SMALL CLAW ASSEMBLY CS/BC/PT

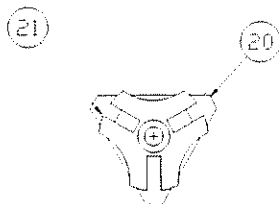
PART NO. 12934

Item	Part Number	Description
1	70168	String, nylon #2 3/4 white, 55"
2	60856	Bushing, nylon 187 OD x 125 ID
4	09602	Cap, top
5	60121	Screw, pph #10 x 1/2 zinc
6	70647	Wire, retrac cord 2-cond 23 ga black
7	60896	Strain relief, rubber
8	51353	Connector, CL End 22-18GA
9	90071	Solder
10	51314	Assembly, standard BP-2000 coil 24V
11	10404	Assembly, coil housing
12	10059	Slide, adjustable claw large
13	61042	Screw, set 4-40 X 1/8 cup point black
14	03970	Retainer, claw finger
15	13110	Shaft, Claw Pivot Upper W/O Washer
16	60037	Washer, Lock 3MM Starlock W/SST Cap
18	05310	Finger, claw small
20	09761	Washer, adjustment large
21	00097	Spider, claw retainer
22	60964	Pin, roll 1/8 x 1/2 ss
23	60317	Screw, ms pph #10-32 x 1-1/4 Zinc
24	90569	Adhesive, Loctite Purple
25	10549	Ring, Claw Spacer
28	10842	Ring, Adjustable

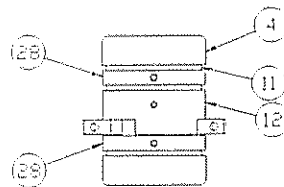


Notes:

- 1) Tin bare ends of item #6 with item #9
- 2) Claw opening 5"
- 3) Apply item #24 sparingly to item #23



Watch Crane

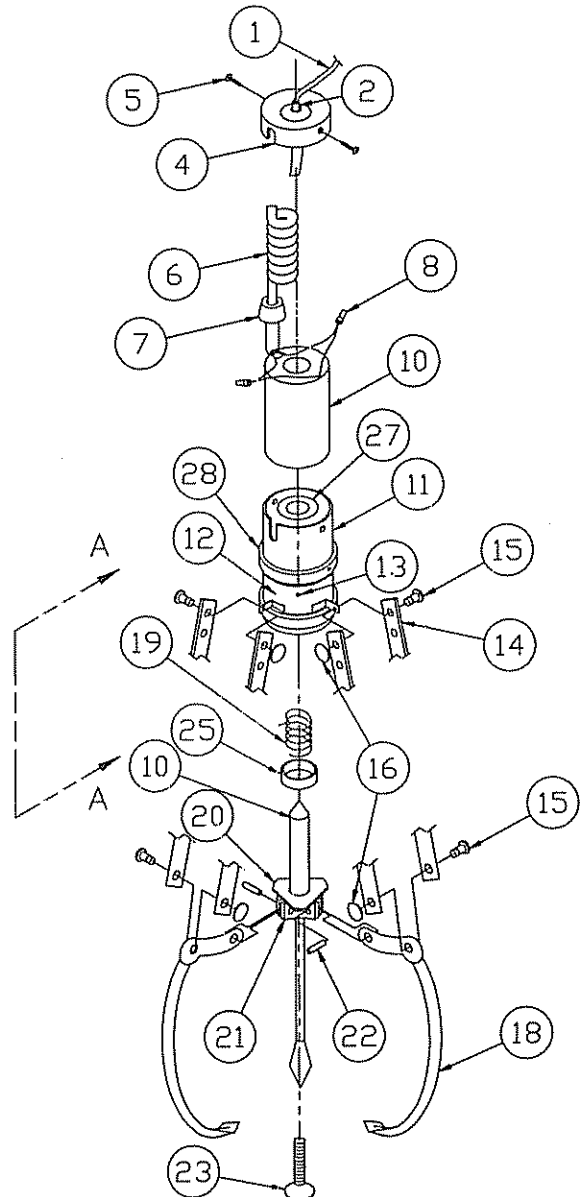


VIEW A-A

ADJUSTABLE MEDIUM CLAW ASSEMBLY CS/BC/PT

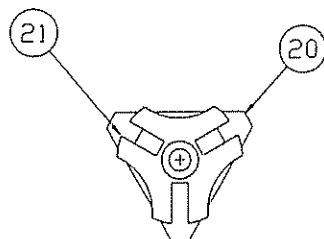
PART NO. 12935

Item	Part Number	Description
1	70168	String, Nylon #2 3/4 White, 55"
2	60856	Bushing, Nylon 187 OD x 125 ID
4	09602	Cap, Top
5	60121	Screw, PPH #10 x 1/2 Zinc
6	70647	Wire, Retrac Cord 2-Cond 23 GG Black
7	60896	Strain Relief, Rubber
8	51353	Connector, CL End 22-18GA
9	90071	Solder
10	51314	Assembly, Standard BP-2000 Coil 24V
11	10404	Assembly, Coil Housing
12	10059	Slide, Adjustable Claw Large
13	61042	Screw, Set 4-40 x 1/8 Cup Point Black
14	03970	Retainer, Claw Finger Jumbo
15	13110	Shaft, Claw Pivot Upper W/O Washer
16	60037	Washer, Lock 3MM Starlock W/SST Cap
18	04770	Finger, Claw Medium
19	61116	Spring, Compression 0 72 LB/IN
20	09761	Washer, Adjustment Large
21	00097	Spider, Claw Retainer
22	60964	Pin, Roll 1/8 x 1/2 SS
23	60317	Screw, MS PFH 10-32 x 1-1/4 zinc
24	90569	Adhesive, Loctite Purple
25	10549	Ring, Claw Spacer
27	10760	Washer, Claw Spring
28	10842	Ring, Adjustable

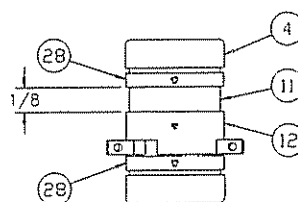


Notes:

- 1) Tin bare ends of item # 6 with item # 9.
- 2) Claw opening 5-1/2" to 6".
- 3) Apply item # 24 sparingly to item # 23



Watch Crane



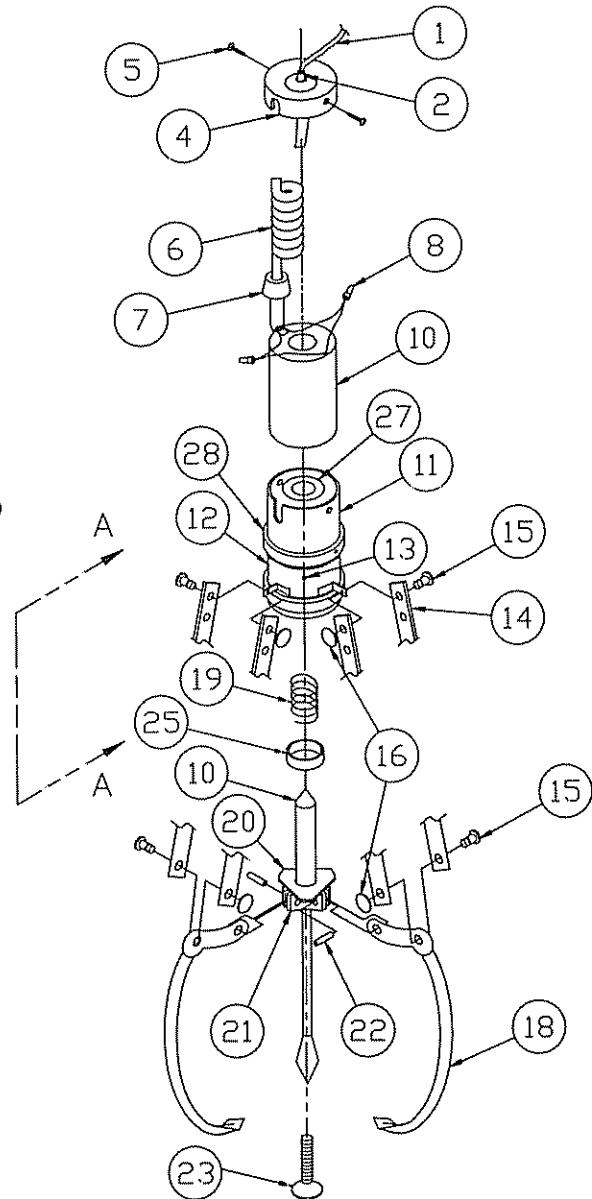
VIEW A-A

ADJUSTABLE LARGE CLAW ASSEMBLY

CS/BC/PT

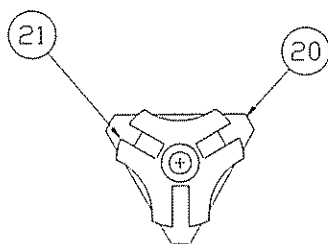
PART NO. 12936

Item	Part Number	Description
1	70168	String, Nylon #2 3/4 White, 55"
2	60856	Bushing, Nylon 187 OD x 125 ID
4	09602	Cap, Top
5	60121	Screw, PPH #10 x 1/2 Zinc
6	70647	Wire, Retrac Cord 2-Cond 23 GG Black
7	60896	Strain Relief, Rubber
8	51353	Connector, CL End 22-18GA
9	90071	Solder
10	51314	Assembly, Standard BP-2000 Coil 24V
11	10404	Assembly, Coil Housing
12	10059	Slide, Adjustable Claw Large
13	61042	Screw, Set 4-40 x 1/8 Cup Point Black
14	03970	Retainer, Claw Finger Jumbo
15	13110	Shaft, Claw Pivot Upper W/O Washer
16	60037	Washer, Lock 3MM Starlock W/SST Cap
18	09268	Finger, Claw Large
19	60986	Spring, Large Claw Assembly
20	09761	Washer, Adjustment Large
21	00097	Spider, Claw Retainer
22	60964	Pin, Roll 1/8 x 1/2 SS
23	60317	Screw, MS PFH 10-32 x 1-1/4 zinc
24	90569	Adhesive, Loctite Purple
25	10549	Ring, Claw Spacer
27	10760	Washer, Claw Spring
28	10842	Ring, Adjustable

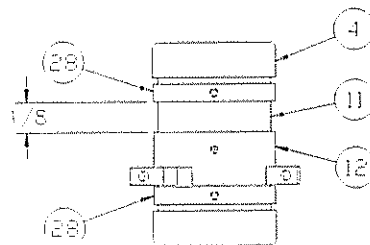


Notes:

- 1) Tin bare ends of item # 6 with item # 9
- 2) Claw opening 5-1/2" to 6"
- 3) Apply item # 24 sparingly to item # 23.



Watch Crane



VIEW A-A

BEAN BAG CRANE ASSEMBLY

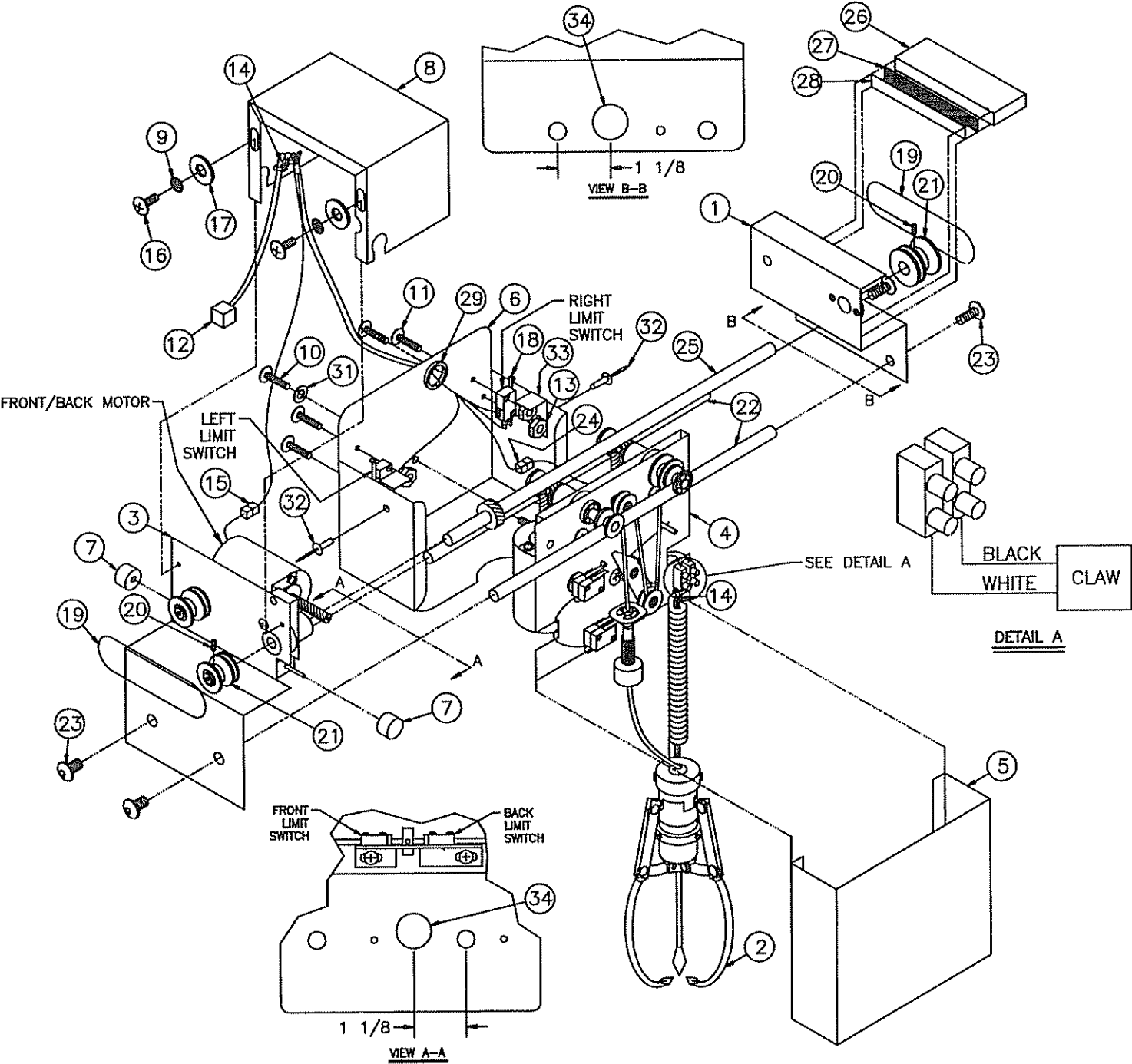
PART NO. 13805

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	13797	Assembly, Trolley End Plate
2	13804	Assembly, Adjustable Medium Claw
3	12932	Assembly, Trolley Motor
4	12928	Assembly, Double Motor
5	01646	Cover, Crane Front
6	09321	Cover, Double Motor
7	07276	Stop, Actuator Switch Large
8	13799	Cover, Trolley Motor
9	60690	Washer, Lock #8 Internal Star
10	60293	Screw, MS #10-24 x 1/2 Zinc
11	60984	Screw, MS PPH 4-40 x 5/8 Zinc
12	13800	Assembly, Harness Crane Head CC 7
13	60109	Nut, Lock 4-40 Nylon Insert
14	60057	Tie, Wire 4" Natural Nylon
15	51179	Connector, 2-Pin MR Female
16	60156	Screw, Mach PPH #8-32 x 1/4
17	60115	Washer, Flat #8 Zinc
18	50142	Switch, Micro W/ Roller Actuator
19	60987	Belt, Rubber 0 079 Square x 10 69
20	60820	Screw, Set # 10-24 x 5/16
21	12744	Roller, Drive Large Black
22	05758	Tube, Crane Track
23	60903	Bolt, Button HD Cap 5/16-18 x 1/2
24	50975	Connector, 9-Pin MR Female
25	05807	Assembly, Trolley Drive Shaft
26	07456	Block, Anti-Slip
27	70616	Velcro, Adhesive Backed 1/2" Wide Hook
28	70619	Velcro, Self Adhesive Back 1/2 Wide Loop
29	60125	Grommet, Rubber 3/4 OD x 7/16 ID x 0 230 Wide
30	90563	Grease, Luberplate
31	60046	Washer, Lock #10 Split Zinc
32	60006	Rivet, Pop 1/8 x 3/16-1/4 Steel
33	06554	Keeper, Crane
34	61140	Disk, Neoprene Rubber 3/4 Dia x 1/16 W/PSA

Notes:

- 1) Refer to item #12 for motor and switch connections
- 2) Grommet is part of item #12
- 3) Add luberplate to brass sleeve

BEAN BAG CRANE ASSEMBLY
PART NO. 13805



NOTES: 1) REFER TO ITEM 12 FOR MOTOR AND SWITCH CONNECTIONS.
2) ADD LUBERPLATE TO BRASS SLEEVE.

CANDY CRANE ASSEMBLY

PART NO. 13798

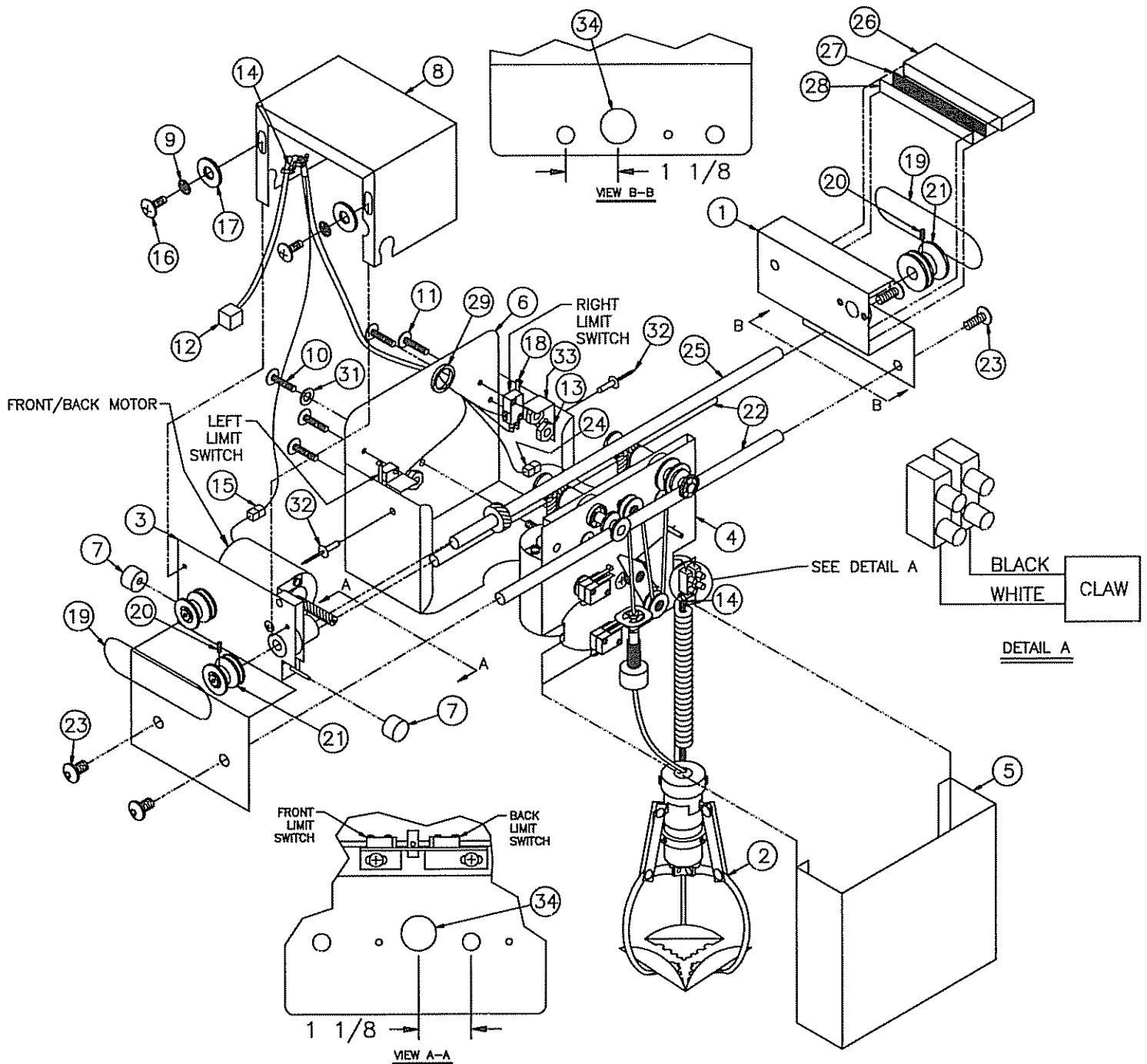
<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	13797	Assembly, Trolley End Plate
2	12933	Assembly, Adjustable Claw 24V CC7G
3	12932	Assembly, Trolley Motor
4	12928	Assembly, Double Motor 24V
5	01646	Cover, Crane Front
6	09321	Cover, Double Motor
7	07276	Stop, Actuator Switch Large
8	13799	Cover, Trolley Motor
9	60690	Washer, Lock #8 Internal Star
10	60293	Screw, MS #10-24 x 1/2 Zinc
11	60984	Screw, MS PPH 4-40 x 5/8 Zinc
12	13800	Assembly, Harness Crane Head CC 7
13	60109	Nut, Lock 4-40 Nylon Insert
14	60057	Tie, Wire 4" Natural Nylon
15	51179	Connector, 2-Pin MR Female
16	60156	Screw, Mach PPH #8-32 x 1/4
17	60115	Washer, Flat #8 Zinc
18	50142	Switch, Micro W/ Roller Actuator
19	60987	Belt, Rubber 0 079 Square x 10 69
20	60820	Screw, Set # 10-24 x 5/16
21	12744	Roller, Drive Large Black
22	05758	Tube, Crane Track
23	60903	Bolt, Button HD Cap 5/16-18 x 1/2
24	50975	Connector, 9-Pin MR Female
25	05807	Assembly, Trolley Drive Shaft
26	07456	Block, Anti-Slip
27	70616	Velcro, Adhesive Backed 1/2" Wide Hook
28	70619	Velcro, Self Adhesive Back 1/2 Wide Loop
29	60125	Grommet, Rubber 3/4 OD x 7/16 ID x 0 230 Wide
30	90563	Grease, Luberplate
31	60046	Washer, Lock #10 Split Zinc
32	60006	Rivet, Pop 1/8 x 3/16-1/4 Steel
33	06554	Keeper, Crane
34	61140	Disk, Neoprene Rubber 3/4 Dia x 1/16 W/PSA

Notes:

- 1) Refer to item #12 for motor and switch connections
- 2) Add luberplate to brass sleeve

CANDY CRANE ASSEMBLY

PART NO. 13798



CLEAN SWEEP/PRIZE TIME CRANE ASSEMBLY

PART NO. 12938

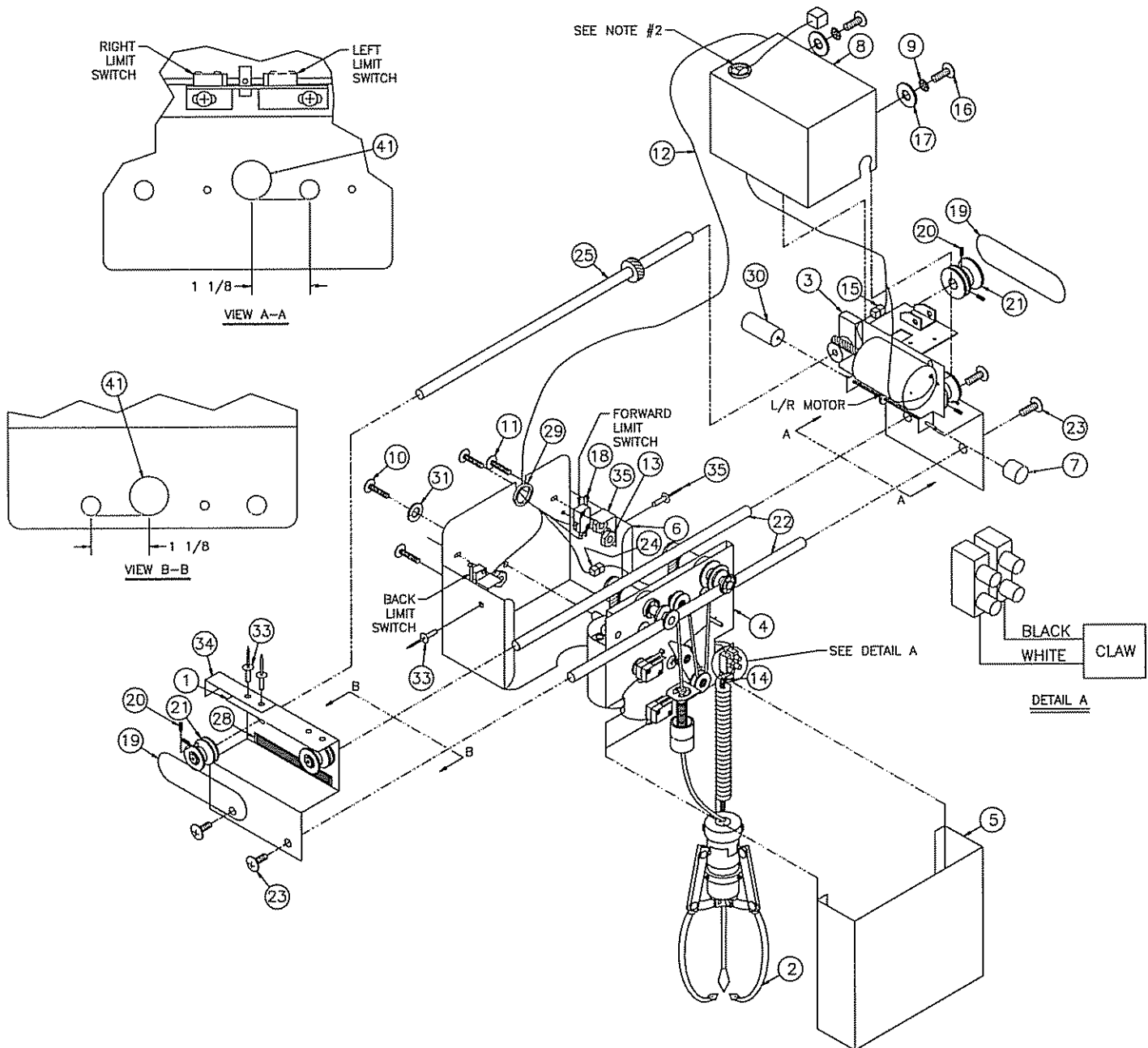
<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	08753	Assembly, Trolley End Plate
2	12935	Assembly, Adjustable Medium Claw
3	12930	Assembly, Trolley Motor
4	12928	Assembly, Double Motor
5	01646	Cover, Crane Front
6	09321	Cover, Double Motor
7	07276	Stop, Actuator Switch Large
8	08833	Cover, Trolley Motor
9	60690	Washer, Lock #8 Internal Star
10	60293	Screw, MS #10-24 x 1/2 Zinc
11	60984	Screw, MS PPH 4-40 x 5/8 Zinc
12	13082	Assembly, Harness Crane Head CS/BC 7
13	60109	Nut, Lock 4-40 Nylon Insert
14	60057	Tie, Wire 4" Natural Nylon
15	51179	Connector, 2-Pin MR Female
16	60156	Screw, Mach PPH #8-32 x 1/4
17	60115	Washer, Flat #8 Zinc
18	50142	Switch, Micro W/ Roller Actuator
19	60987	Belt, Rubber 0 079 Square x 10 69
20	60985	Screw, Set # 6-32 x 1/4 Cup Black Zinc
21	12752	Roller, Large Long W/ Set Screw
22	08693	Tube, Crane Track
23	60903	Bolt, Button HD Cap 5/16-18 x 1/2
24	50975	Connector, 9-Pin MR Female
25	08725	Assembly, Trolley Drive Shaft
28	70619	Velcro, Self Adhesive Back 1/2 Wide Loop
29	60125	Grommet, Rubber 3/4 OD x 7/16 ID x 0 230 Wide
30	10057	Stop, Actuator Switch Medium Claw
31	60046	Washer, Lock #10 Split Zinc
32	90563	Grease, Luberplate
33	60006	Rivet, Pop 1/8 x 3/16-1/4 Steel
34	12306	Assembly, Stop Bracket
35	06554	Keeper, Crane
41	61140	Disk, Neoprene Rubber 3/4 Dia x 1/16 W/PSA

Notes:

- 1) Refer to item #12 for motor and switch connections
- 2) Grommet is part of item #12.
- 3) Add luberplate to brass sleeve.

CLEAN SWEEP/PRIZE TIME CRANE ASSEMBLY

PART NO. 12938



BEAR CLAW CRANE ASSEMBLY

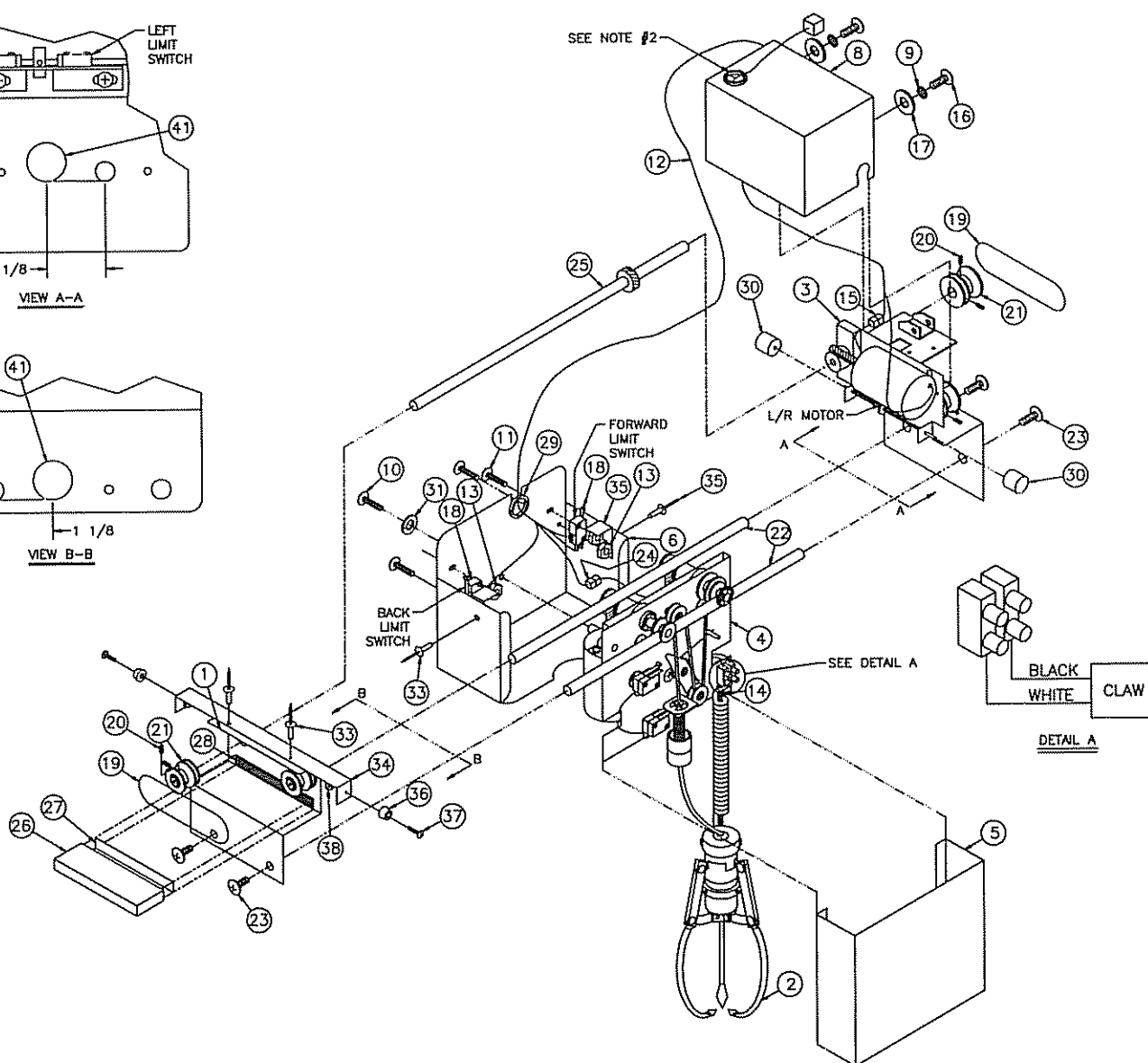
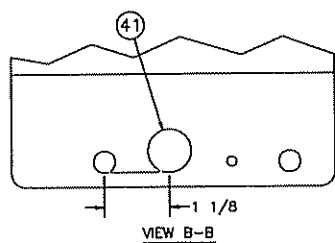
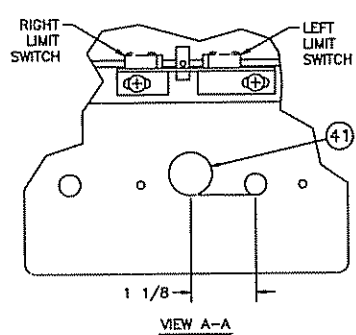
PART NO. 12942

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	08753	Assembly, Trolley End Plate
2	12935	Assembly, Adjustable Medium Claw
3	12930	Assembly, Trolley Motor
4	12928	Assembly, Double Motor
5	01646	Cover, Crane Front
6	09321	Cover, Double Motor
8	08833	Cover, Trolley Motor
9	60690	Washer, Lock #8 Internal Star
10	60293	Screw, MS #10-24 x 1/2 Zinc
11	60984	Screw, MS PPH 4-40 x 5/8 Zinc
12	13082	Assembly, Harness Crane Head CS/BC 7
13	60109	Nut, Lock 4-40 Nylon Insert
14	60057	Tie, Wire 4" Natural Nylon
15	51179	Connector, 2-Pin MR Female
16	60156	Screw, Mach PPH #8-32 x 1/4
17	60115	Washer, Flat #8 Zinc
18	50142	Switch, Micro W/ Roller Actuator
19	60987	Belt, Rubber 0 079 Square x 10 69
20	60985	Screw, Set # 6-32 x 1/4 Cup Black Zinc
21	12752	Roller, Large Long W/ Set Screw
22	11729	Tube, Crane Track
23	60903	Bolt, Button HD Cap 5/16-18 x 1/2
24	50975	Connector, 9-Pin MR Female
25	11801	Assembly, Trolley Drive Shaft
28	70619	Velcro, Self Adhesive Back 1/2 Wide Loop
29	60125	Grommet, Rubber 3/4 OD x 7/16 ID x 0 230 Wide
30	10057	Stop, Actuator Switch Medium Claw
31	60046	Washer, Lock #10 Split Zinc
32	90563	Grease, Luberplate
33	60006	Rivet, Pop 1/8 x 3/16-1/4 Steel
34	10624	Assembly, Stop Bracket
35	06554	Keeper, Crane
36	60375	Bumper, Rubber Recess
37	60198	Screw, MS PPH 8-32 X 1/2 Zinc
38	60073	Nut, Lock 8-32 Nylon Insert
41	61140	Disk, Neoprene Rubber 3/4 Dia x 1/16 W/PSA

Notes:

- 1) Refer to item #12 for motor and switch connections
- 2) Grommet is part of item #12
- 3) Add luberplate to brass sleeve.

BEAR CLAW CRANE ASSEMBLY PART NO. 12942

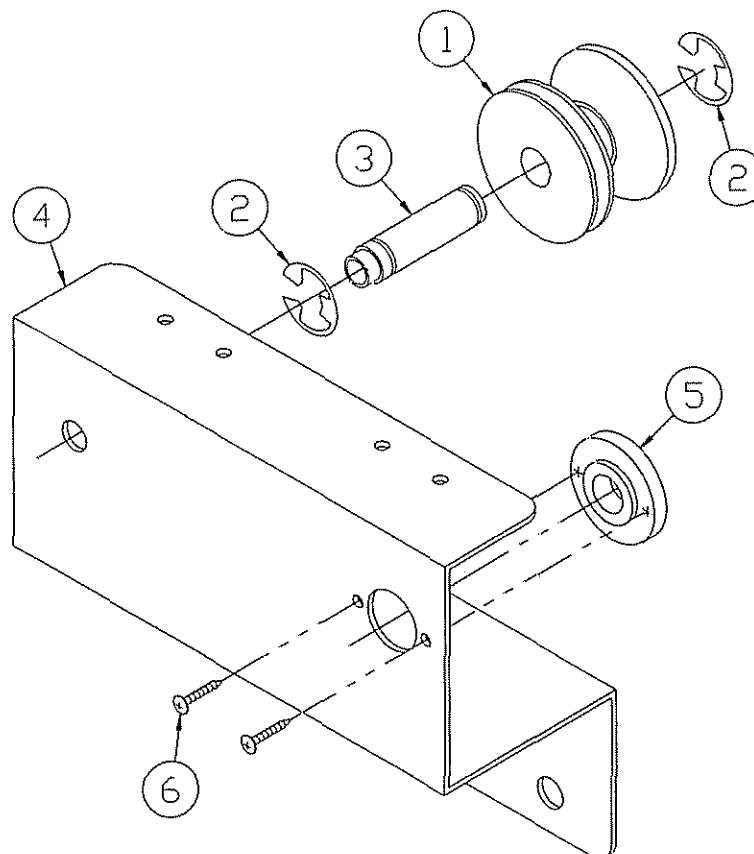


**CLEAN SWEEP / BEAR CLAW / PRIZE TIME
TROLLEY END PLATE ASSEMBLY
PART NO. 8753**

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	12751	Roller, Long Large Black
2	60024	E-Ring, 3/8 Diameter
3	08214	Roller, Free Shaft for 5/8" Rail
4	06550	Plate, Trolley End
5	12746	Bushing, Shaft Black

**BEAN BAG/CANDY CRANE TROLLEY END PLATE ASSEMBLY
PART NO. 13797**

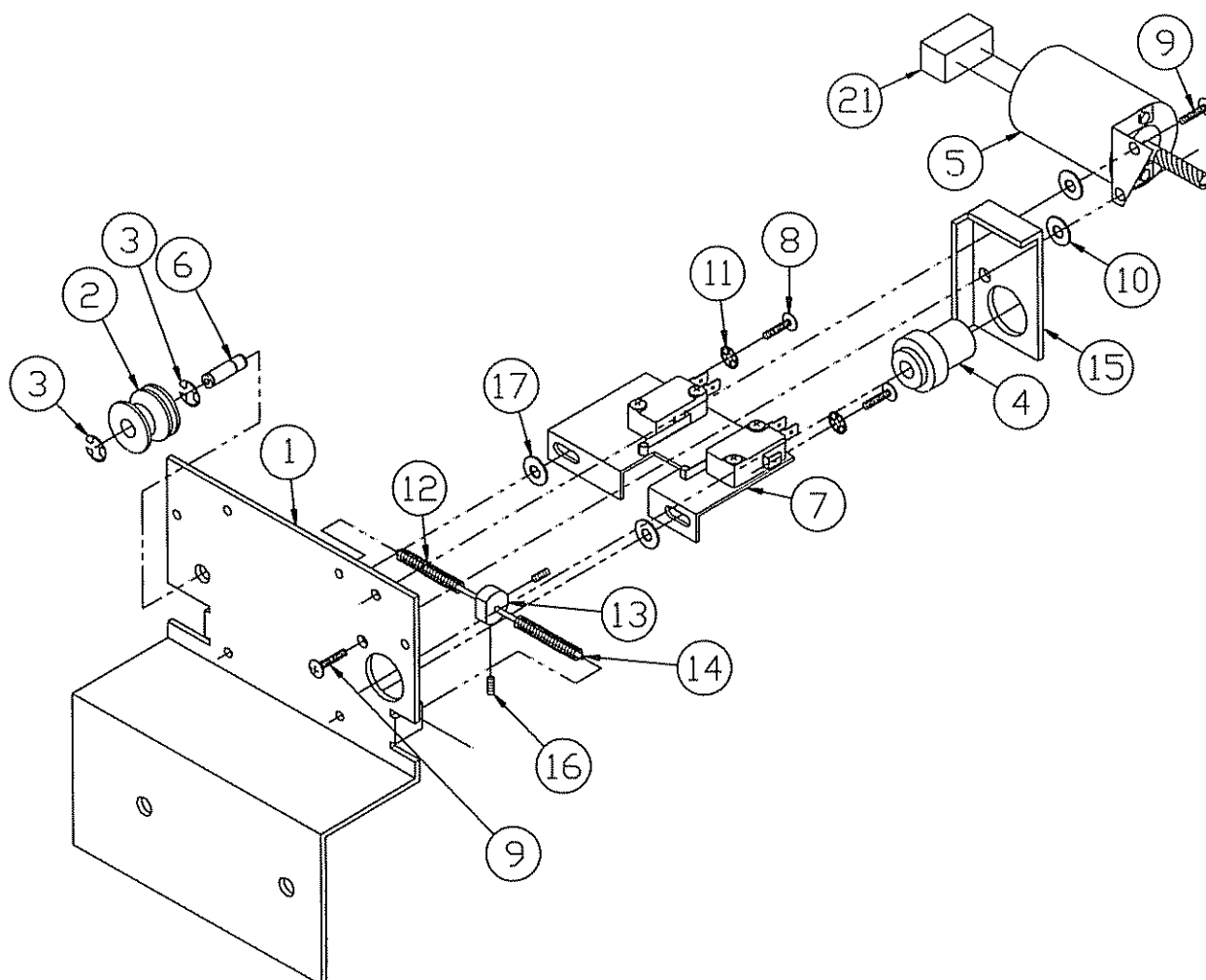
<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	12743	Roller, Free Long Large Black
2	60024	E-Ring, 3/8 Diameter
3	08214	Roller, Free Shaft for 5/8" Rail
4	06550	Plate, Trolley End
5	12746	Bushing, Shaft Black
6	60042	Screw, PPH #4 x 1/4 Zinc



BEAN BAG/CANDY CRANE TROLLEY MOTOR ASSEMBLY

PART NO. 12932

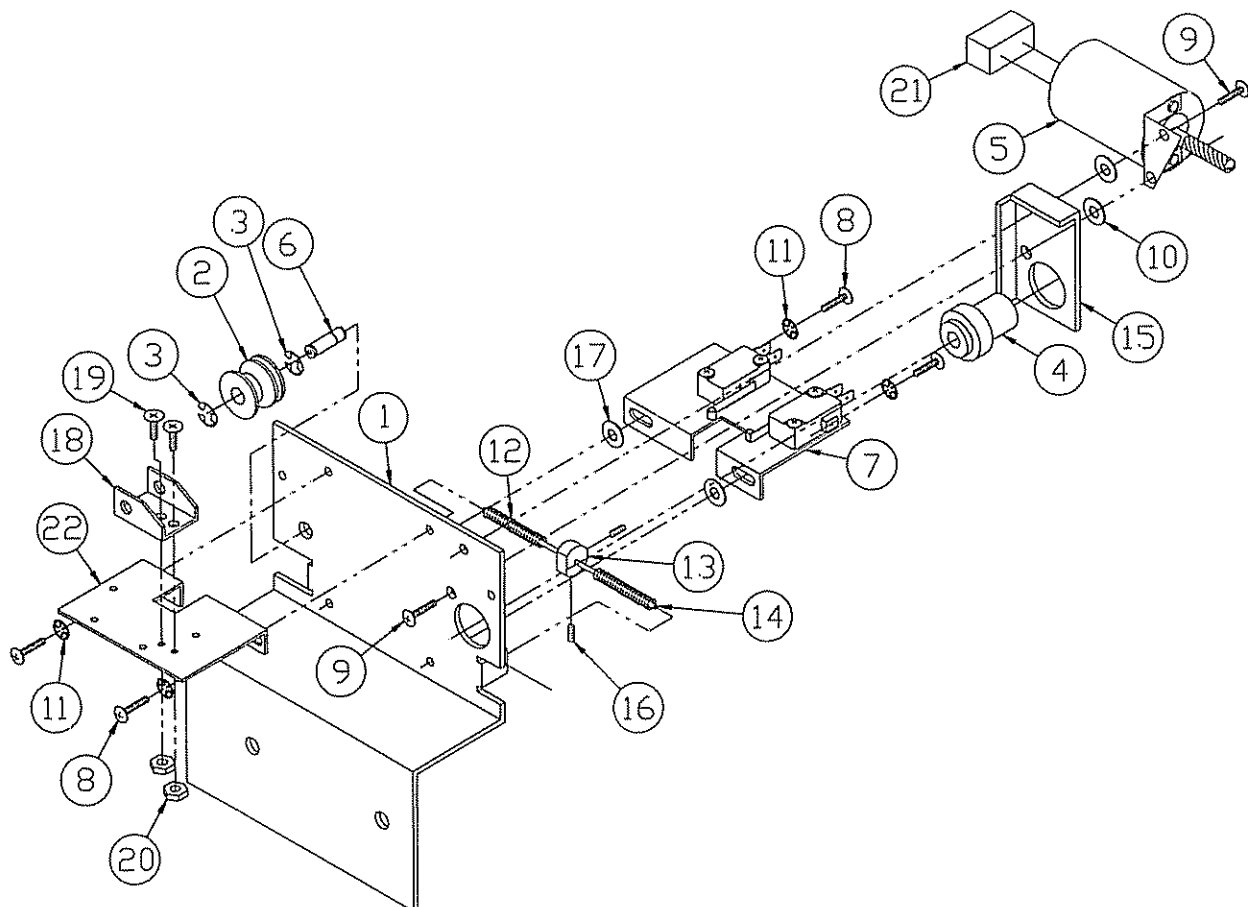
<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	08752	Plate, Trolley Motor and Switch
2	12743	Roller, Free Large Long
3	60024	E-Ring, 3/8 Diameter
4	12747	Bearing, Nylon Thrust
5	13588	Assembly, Crane Motor W/ Pins
6	06545	Shaft, Free Roller for 5/8 Diameter Rail
7	08900	Assembly, Left / Right Limit Switch
8	60156	Screw, MS PPH #8 x 32 x 1/4 Zinc
9	60174	Screw, Mach PPH # 10-32 x 3/4 Zinc
10	60043	Washer, #10 Flat Zinc
11	60690	Washer, Lock #8 Internal Star
12	60955	Spring, Bi - Directional Stop
13	09011	Actuator, Double Switch
14	08856	Rod, Stop Long
15	06553	Plate, Shaft Alignment
16	60985	Screw, Set #6 - 32 x 1/4 Cup Black Zinc
17	60115	Washer, Flat #8 Zinc
21	51178	Connector, 2-Pin MR Male



CLEAN SWEEP / BEAR CLAW / PRIZE TIME

TROLLEY MOTOR ASSEMBLY -- PART NO. 12930

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	08752	Plate, Trolley Motor and Switch
2	12751	Roller, Free Large Long
3	60024	E-Ring, 3/8 Diameter
4	12747	Bearing, Nylon Thrust
5	13588	Assembly, Crane Motor W/ Pins
6	08214	Shaft, Free Roller for 5/8 Diameter Rail
7	08900	Assembly, Left / Right Limit Switch
8	60156	Screw, MS PPH #8 x 32 x 1/4 Zinc
9	60174	Screw, Mach PPH # 10-32 x 3/4 Zinc
10	60043	Washer, #10 Flat Zinc
11	60690	Washer, Lock #8 Internal Star
12	60955	Spring, Bi - Directional Stop
13	09011	Actuator, Double Switch
14	08856	Rod, Stop Long
15	06553	Plate, Shaft Alignment
16	60985	Screw, Set #6 - 32 x 1/4 Cup Black Zinc
17	60115	Washer, Flat #8 Zinc
18	60978	Chain, Cable Bracket Bore Black
19	60182	Screw, MS PFH 4-40 x 3/8 Zinc
20	60109	Nut, Lock 4-40 Nylon Insert
21	51178	Connector, 2-Pin MR Male
22	08903	Bracket, Limit Switch

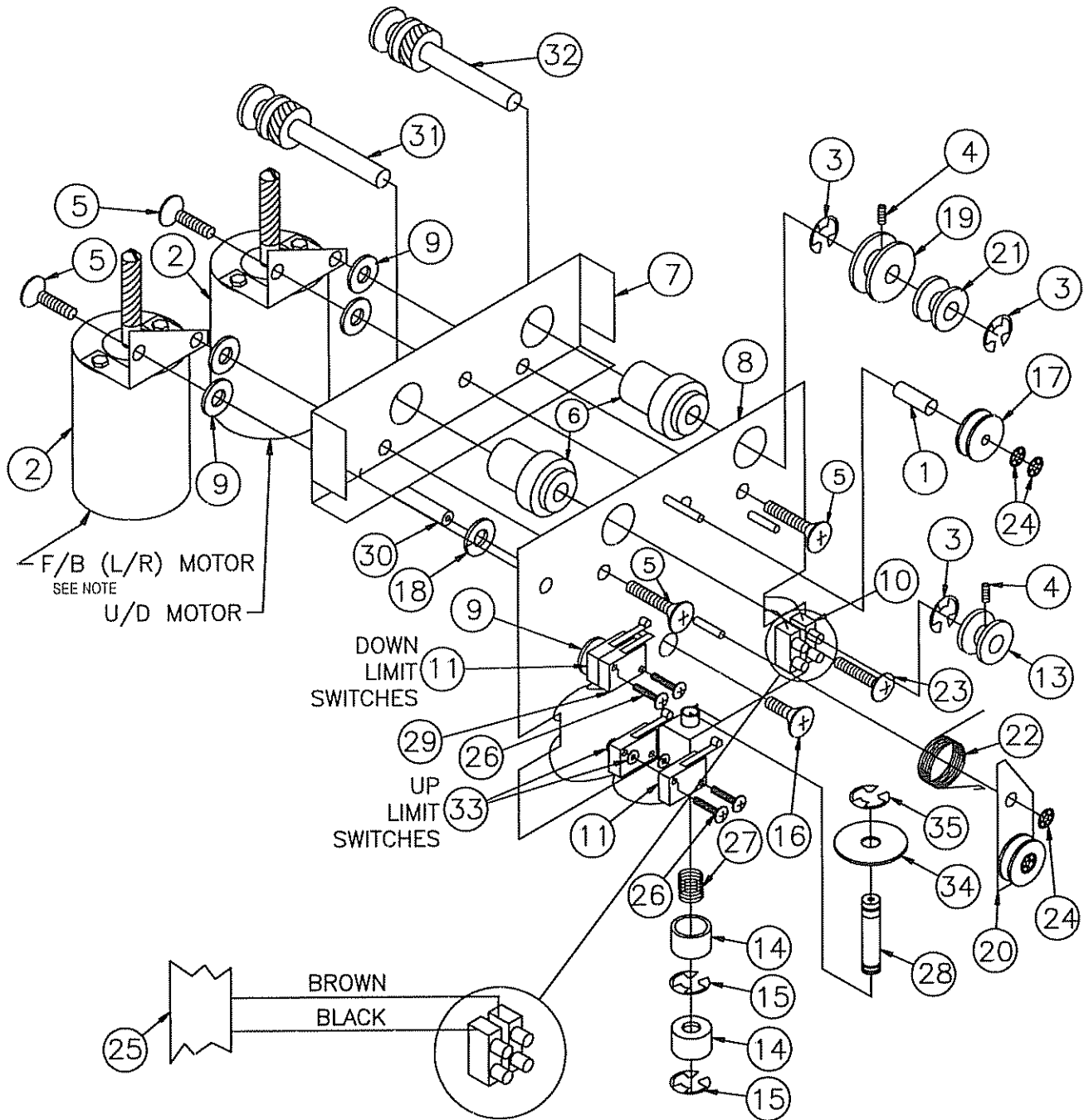


DOUBLE MOTOR ASSEMBLY

PART NO. 12928

Item	Part Number	Description
1	00057	Sleeve, Cable Roller brass 3/8 x 5/16
2	13588	Assembly, Crane Motor W/ Pins
3	60024	E-Ring, 3/8 Diameter
4	60821	Screw, Set 10-24 x 1/4
5	60192	Screw, MS PPH 10-32 x 1 Zinc
6	12747	Bearing, Plastic Thrust Black
7	06551	Plate, Shaft Alignment
8	09344	Assembly, Plate W/ Bushing
9	60043	Washer, Flat #10 USSS Zinc
10	01615	Terminal, Block 2- Position
11	50142	Switch, Micro W/ Roller Actuator
13	12749	Roller, Small Drilled Black
14	08213	Stop, Anti-Sway Claw
15	60027	E-Ring, 5/16 Diameter
16	61057	Screw, MS PFH # 10-24 x 1/2 Zinc
17	12748	Roller, Cable Black
18	60046	Washer, Lock Split #10 Zinc
19	12750	Spool, Cable Black
20	12523	Assembly, Idler Lever Large, CS
21	12745	Roller, Small Black
22	60029	Spring, Lever
23	61133	Screw, PPH 6-32 x 3/4 Zinc
24	60030	Nut, Push 3/16 Diameter
25	13081	Assembly, Harness Double Motor
26	60169	Screw, MS PPH 4-40 x 1 Zinc
27	61132	Spring, Claw Retract
28	09340	Cable, Sleeve
29	09387	Switch, Redundant
30	10695	Post, Cover Support
31	04817	Assembly, Sub Crane Drive Shaft
32	04818	Assembly, Shaft and Gear
33	60111	Washer, Flat #4 Zinc
34	09342	Plate, Cable Sleeve
35	60745	E-Ring, 1/4 Diameter

DOUBLE MOTOR ASSEMBLY PART NO. 12928

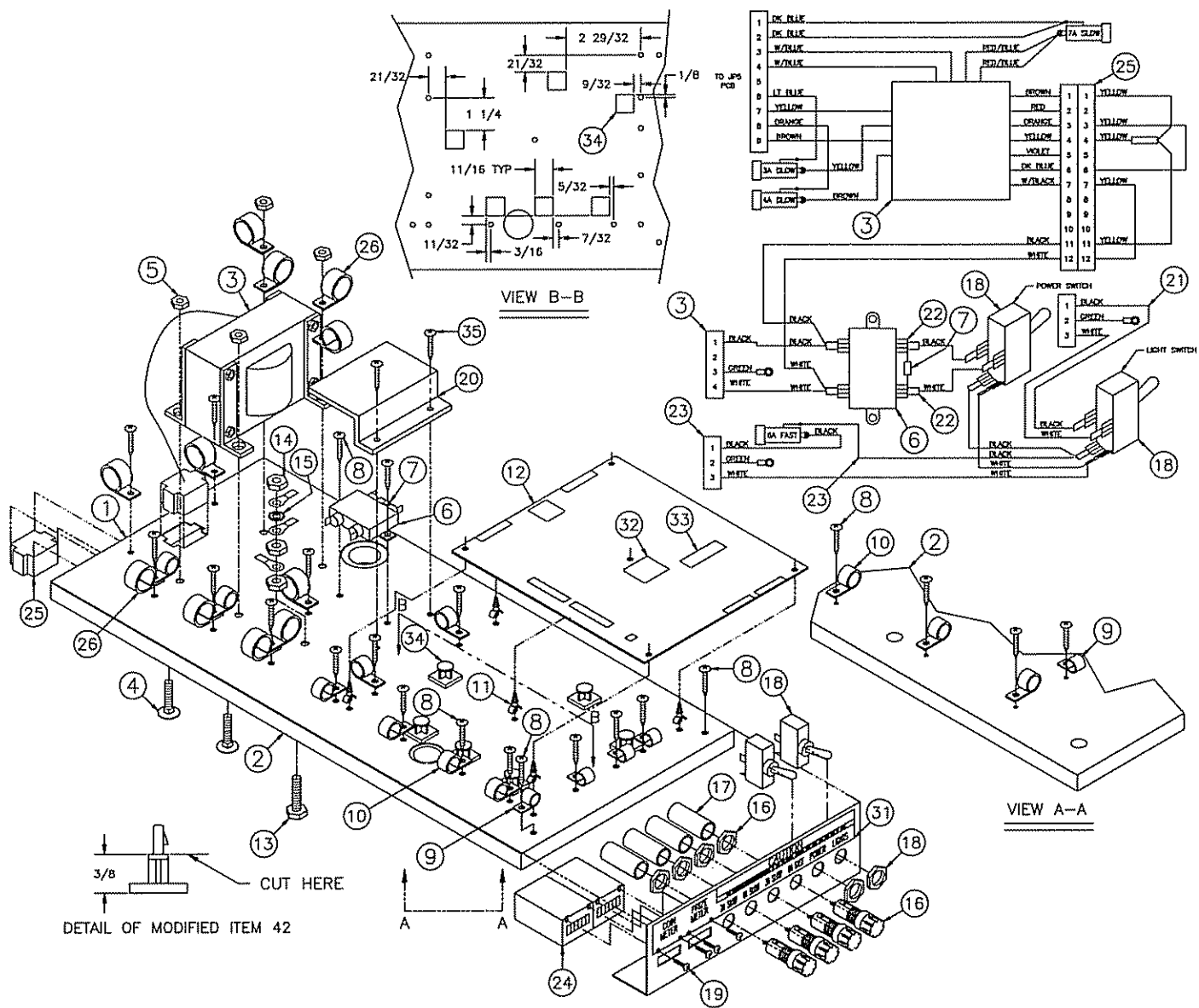


Note: Front/Back motor for CS and BC, Left/Right motor for CC and BB

CLEAN SWEEP / BEAR CLAW / PRIZE TIME
COMPONENT BOARD ASSEMBLY
PART NO. 13034-100

Item	Part Number	Description
1	13035	Plate, Drip Shield
2	13036	Component Board, Wood
3	13037	Assy, Harness Power W/Transformer
4	60163	Bolt, Carr 10-24 x 1-1/4 Zinc
5	61040	Nut, Keps 10-24 Zinc
6	50065	EMI Filter, 5A 120/250V
7	50066	Diode, Transient Surge Bulk 1 5KE220CA
8	60624	Screw, PB PPH 8-32 x 5/8 Zinc
9	61060	Clip, Wire Harness 3/8 Nylon
10	61061	Clip, Wire Harness 1/2 Nylon
11	61109	Standoff, 3/8 Nylon
12	51329	PCB Assy, BP2000
13	60531	Bolt, HH 1/4-20 x 1-1/2 Zinc
14	60553	Nut, Keps 1/4-20 Zinc
15	61084	Washer, Lock 1/4 External Star Zinc
16	50012	Fuseholder, Panel Mount W/Nut & Cap
17	70158	Tubing, Vinyl 1/2 ID x 5/8 OD Clear Roll
18	51322	Switch, Toggle DPST Tab Terminals
19	60180	Screw, MS PPH 4-40 x 1/4 Zinc
20	01667	Cover, EMI Filter
21	13038	Assy, Harness Power Lights
22	13039	Assy, Harness EMI Line
23	13040	Assy, Harness Power AC in
24	60060	Counter, Coins 12VDC W/Bracket
25	13002	Assy, Harness 120VAC Adapter
26	60315	Clip, Wire Harness 3/4
27	51331	Fuse, 7A 250V 3AG Slow
28	50967	Fuse, 4A 250V 3AG Slow
29	50939	Fuse, 3A 250V 3AG Slow
30	51332	Fuse, 6A 250V 3AG Fast
31	13096	Decal Front Component Board
32	51333-100	IC, AT89C55 Microprocessor W/20KB EPROM (non-% controller)
33	50932-100	IC, E-PROM 4MEG CMOS 20NS (sound)
34	51334	Support, Circuit Board 3/8"
35	60729	Screw, POH 8-18 x 3/4 W/CSK Washer

**CLEAN SWEEP / BEAR CLAW / PRIZE TIME
COMPONENT BOARD ASSEMBLY
PART NO. 13034-100**

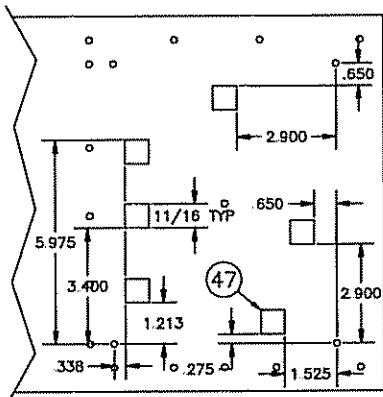
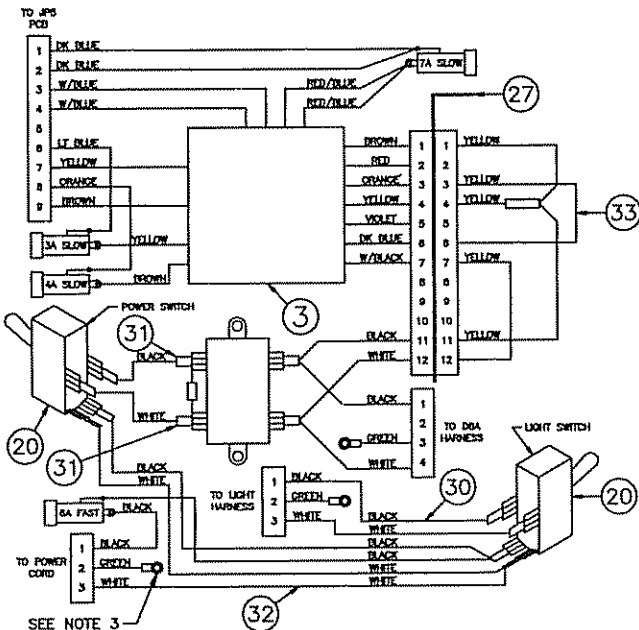


BEAN BAG/CANDY CRANE COMPONENT BOARD ASSEMBLY

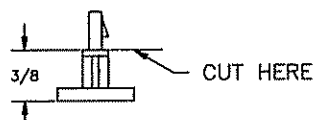
PART NO. 13784

Item	Part Number	Description
1	13782	Plate, Drip Shield
2	13783	Component Board, Wood
3	13037	Assy, Harness Power W/Transformer
4	60163	Bolt, Carr 10-24 x 1-1/4 Zinc
5	61040	Nut, Keps 10-24 Zinc
6	50065	EMI Filter, 5A 120/250V
7	50066	Diode, Transient Surge Bulk 1.5KE220CA
8	60624	Screw, PB PPH 8-32 x 5/8 Zinc
9	60062	Standoff, 1/2 OD X 3/16 ID X 1/2 C
10	61060	Clip, Wire Harness 3/8 Nylon
11	61061	Clip, Wire Harness 1/2 Nylon
12	60315	Clip, Wire Harness 3/4
13	61109	Standoff, 3/8 Nylon
14	51329	PCB Assy, BP2000
15	60152	Bolt, Carr 1/4-20 X 1-1/2 Zinc
16	60553	Nut, Keps 1/4-20 Zinc
17	61084	Washer, Lock 1/4 External Star Zinc
18	50012	Fuseholder, Panel Mount W/Nut & Cap
19	70158	Tubing, Vinyl 1/2 ID x 5/8 OD Clear Roll
20	51322	Switch, Toggle DPST Tab Terminals
21	60060	Counter, Coins 12VDC W/Bracket
22	60180	Screw, MS PPH 4-40 x 1/4 Zinc
23	13779	Bracket, Power Box Control Panel
24	13780	Cover, Power Box Control Pane
25	60045	Screw, MS PPH 8-32 X 3/4 Zinc
26	61075	T-Nut, 8-32 X 1/4 3-Prong
27	13781	Bracket, Adapter Plug
28	01667	Cover, EMI Filter
29	60729	Screw, POH 8-18 x 3/4 W/CSK Washer
30	13038	Assy, Harness Power Lights
31	13039	Assy, Harness EMI Line
32	13040	Assy, Harness Power AC in
33	13002	Assy, Harness 120VAC Adapter
34	08216	Decal, Caution
35	50939	Fuse, 3A 250V 3AG Slow
36	50967	Fuse, 4A 250V 3AG Slow
37	51331	Fuse, 7A 250V 3AG Slow
38	51332	Fuse, 6A 250V 3AG Fast
39	10737	LABEL, COIN METER
40	10736	LABEL, PRIZE METER
41	08878	DECAL, POWER
42	09471	DECAL, LIGHTS CS60
43	08372	DECAL, 3-AMP 250-VOLT SLOW
44	08371	DECAL, 4-AMP 250-VOLT SLOW
45	12922	DECAL, 7A 250V SLOW
46	12923	DECAL, 6A 250V FAST
47	51334	Support, Circuit Board 3/8"
48	60870	Screw, Wood PPH 8 x 1-1/2 Zinc
49	51333-100	IC, AT89C55 Microprocessor W/20KB EPROM (non-% controller)
50	50932-100	IC, E-PROM 4MEG CMOS 20NS (sound)

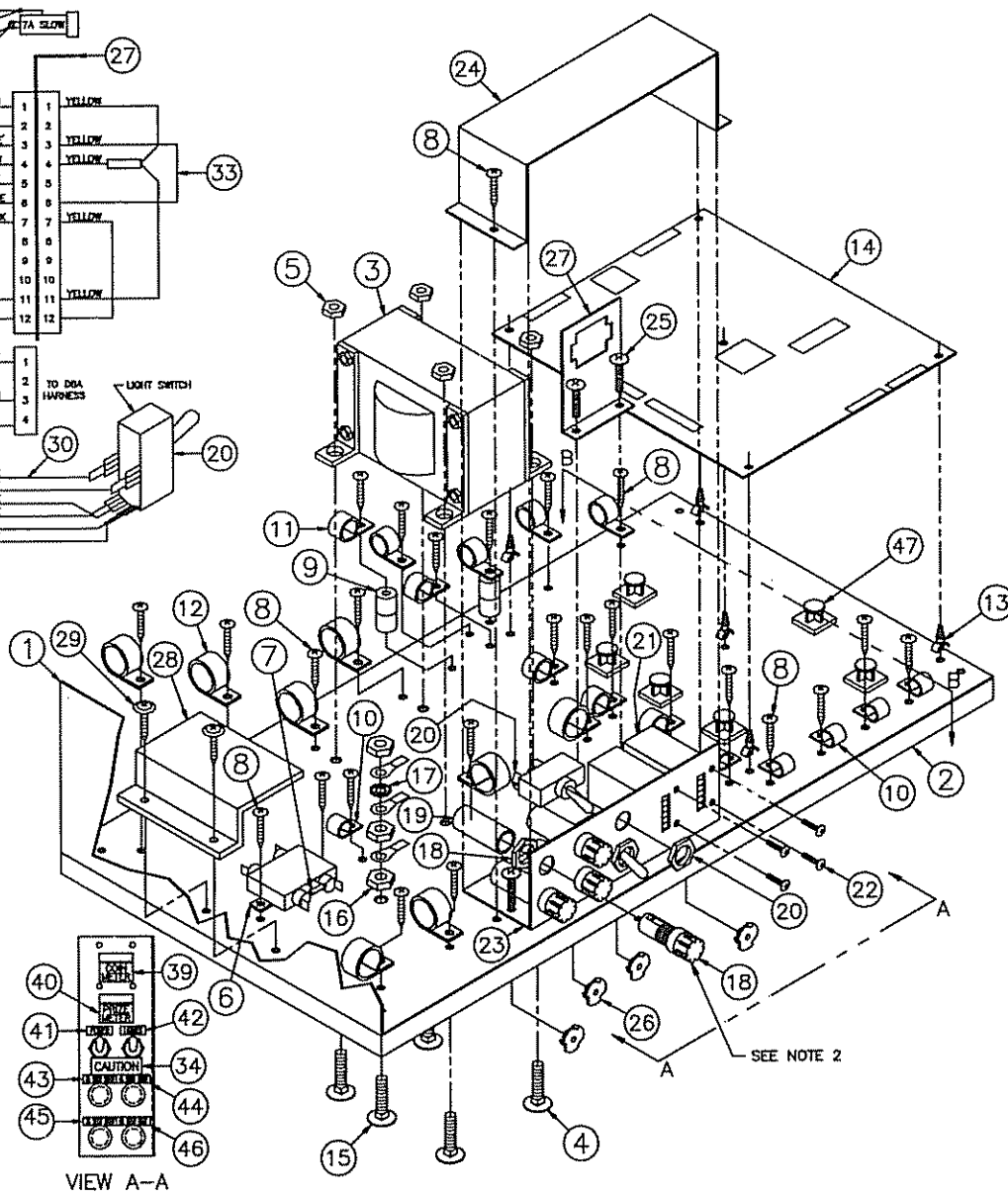
BEAN BAG/CANDY CRANE COMPONENT BOARD ASSEMBLY
PART NO. 13784



VIEW B-B



DETAIL OF MODIFIED ITEM 47



VIEW A-A

SECTION FIVE:

TROUBLESHOOTING

TROUBLESHOOTING

As with all electronic devices, always be very careful when servicing this unit. Always disconnect power to the unit when you are working inside the unit. Carelessness can damage the electronics or you may receive a shock and injure yourself. Most connections are designed to prevent wrong connections. Even so, always know what you are disconnecting and connecting. All connections may be made with minimal force. If a connection can not be made easily verify that it is the proper connection and that the connector is positioned correctly. Do not force any connections.

The test section of the audit/test mode can be very helpful with troubleshooting. The claw and motors can be tested thoroughly without waiting for specific events to occur in game play. Switches can be tested in the switch test mode.

The motor test area is useful for unwinding the claw string if it is wound up backwards. If the claw string is wound up backwards it will not be unwound in normal game mode. As the motor attempts to drop the claw it will actually be pulling the claw upwards. The motor will shut off if this occurs. If the claw string is wound up backwards, the claw can be dropped manually in game mode without entering test mode.

This is done by turning the game on while the up limit switch is held in the closed position. By doing this the motor will attempt to pull the claw up, actually dropping the claw. A slot in the Up / Down motor shaft enables the operator to loosen the claw with a screw driver. To release string tension and return string to correct position on take-up spool, take a flat head screw driver and turn the worm gear counter clockwise. This backs the string out into the proper position by reversing the turning direction of the take-up spool. See Figure 1.

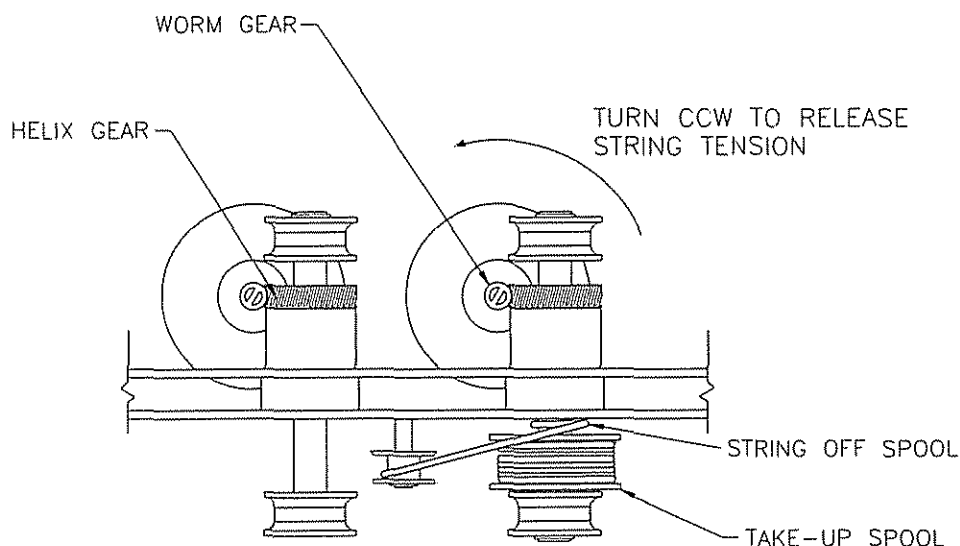


Figure 1

Open fuse problems can easily be narrowed down with the following procedure. Turn the game off and replace the fuse. Inspect each component and wiring associated with the fuse. Disconnect all these components as close to the fuse as possible. Continuity checks across the component leads at the connection may show a faulty component or faulty wiring. If not, connect the components one at a time and enable that component. The first component that opens the fuse is most likely the problem. To isolate the problem to the component or the wiring a similar procedure can be followed. Turn the game off and replace the fuse. Disconnect all in line wire connections to that component. Continuity checks across the wiring may show faulty wiring. If not, connect the connections one at a time, starting as close to the fuse as possible. The first area to open the fuse is most likely the problem. Power supply over-current problems can be narrowed down with the same procedure.

Experience with the crane will show that the most common problems are associated with the crane wagon. The switches must all be working properly in correct adjustment. On the following pages are some specific problems that may be encountered with the unit and some possible solutions. These items do not include problems that are associated primarily with faulty wiring or board problems. All of the items listed can be contributed to faulty wiring or board problems. Therefore, these possible causes are not listed for many of the problems. Another possible cause that is common to many of the items listed is incorrect game settings.

To ensure fair and proper game play a series of periodic and annual tests and adjustments should be made to the crane game.

- | | |
|------------------|---|
| Periodic: | Check for proper game play, by testing claw strength and adjustments.
Provide visual inspection of the crane
Visually inspect limit switches for actuation
Check that joystick is working properly |
| Annual: | Replace belts on crane wagon assembly
Clean and re-adjust brass plunger assembly
Clean excessive dust and debris from crane assembly, component drawer assembly, and all other working parts
Check for any loose connections or bare/ frayed wires on the crane assembly and the component drawer assembly |

If you need assistance please contact our Customer Service Department.

TROUBLESHOOTING (continued)

PROBLEM

No lights and nothing functioning

CAUSE

Open main fuse
Plug not connected
Open power switch

Main fuse opens repeatedly

Shorted primary circuit component or wiring
EMI filter transient surge suppressor diode shorted
Problems with main game lights or wiring

Board not functioning correctly

EPROM U1 not seated correctly
Bad board component

No sound or sound not correct

Volume too low
EPROM U7 not seated correctly
Bad board component

No crane motor movement

No connection to crane wagon
No connection to joystick or no ground to joystick
Fuse open
2 5VAC not present from transformer to board

Single crane motor not moving

Closed limit switch in that direction
Crane wagon wheel off track
Drive belt not seated on wheels correctly
Bad joystick switch
Motor driver circuit fault
Bad shaft gear or motor/gear alignment
Bad motor

Claw not closing

Open connection on coiled solenoid cable
Solenoid driver circuit fault
Claw strength set too low
Bad solenoid

TROUBLESHOOTING (continued)

PROBLEM

Claw stays closed

CAUSE

Solenoid plunger sticking inside solenoid
Claw fingers not adjusted correctly
Claw solenoid circuit fault

Motor keeps running

Limit switch is not adjusted correctly
Bad limit switch

Claw string winds up backwards

String is not threaded correctly
Knot in claw string is not placed correctly
Claw string is binding in spool
Down limit switch is not adjusted correctly
Bad down limit switch (open)
Idler arm spring is broken or arm is binding

Claw does not drop correctly

Claw string is not threaded correctly or wound backwards
Claw string is binding in spool
Brass cable sleeve spring is broken
Down limit switch is not adjusted correctly
Bad down limit switch (closed)
Idler arm spring is broken or arm is binding
Bad joystick switch
Up/down motor driver circuit fault
Bad up/down motor

Claw does not return to top

String not threaded through pulleys correctly
Up limit switch is not adjusted correctly
Bad up limit switch
Brass cable sleeve is binding in guides
Up/down motor driver circuit fault
Bad up/down motor

The following is a list of the LED indicators on the BP2000 controller board, the output device to which the LEDs are connected, and the indications provided by these LED indicator

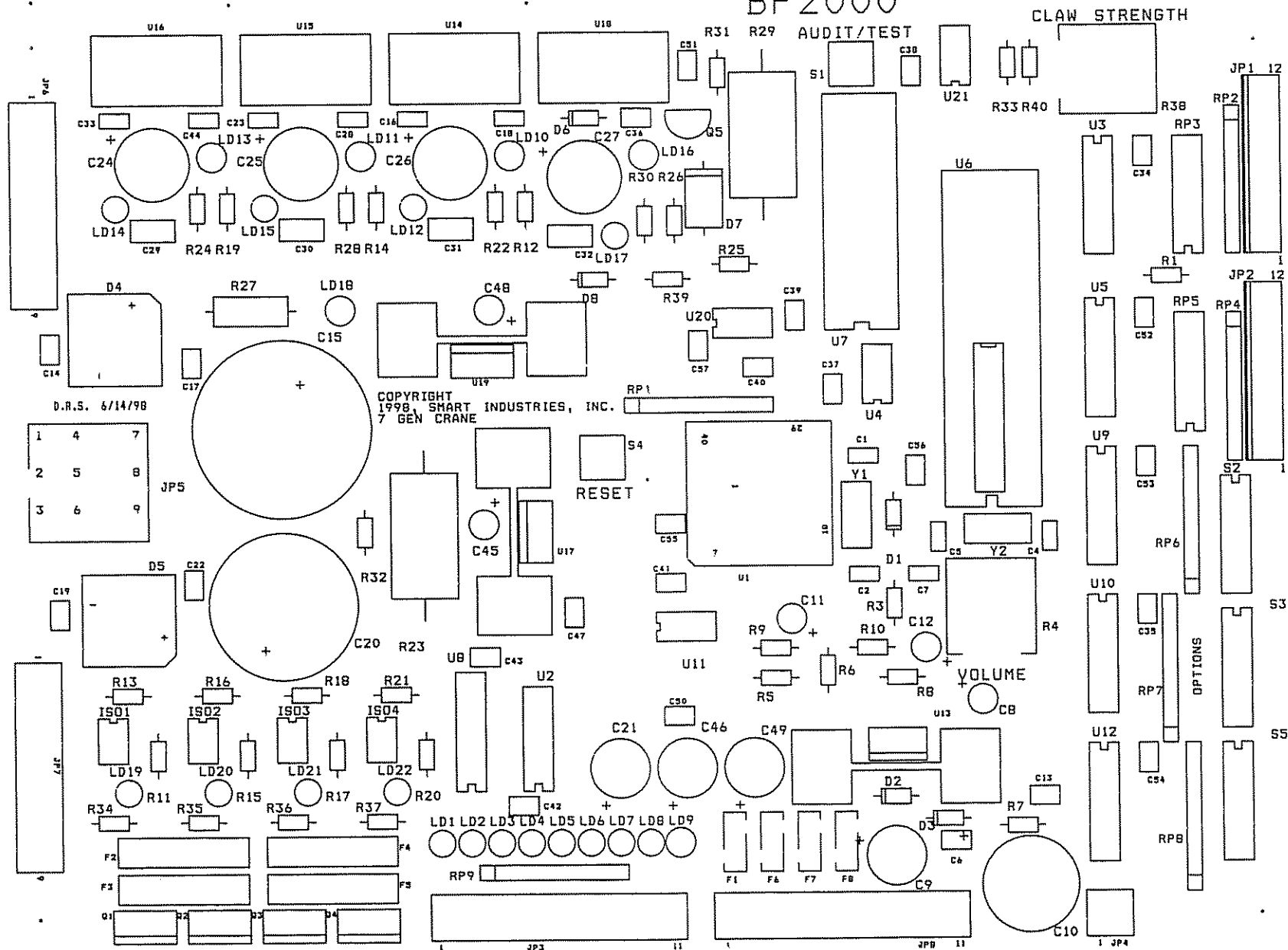
LED #	Output Device	Indications	
LD1	Coin Meter (Meter 1)	On = Drive Occurring	Off = No Drive Occurring
LD2	Prize Meter (Meter 2)	On = Drive Occurring	Off = No Drive Occurring
LD3	Forward Push Button Light (Spare O1)	On = Drive Occurring	Off = No Drive Occurring
LD4	Left/Right Push Button Light (Spare O2)	On = Drive Occurring	Off = No Drive Occurring
LD5	Display Data (Disp 0)	On = Drive Occurring	Off = No Drive Occurring
LD6	Display Clock (Disp 1)	On = Drive Occurring	Off = No Drive Occurring
LD7	Display Strobe (Disp 2)	On = Drive Occurring	Off = No Drive Occurring
LD8	Card Dispenser Bulk Vendor/Gum Ball Dispenser (Disp 3)	On = No Drive Occurring	Off = Drive Occurring
LD9	"Heart Beat"	Flashing On and Off = Normal Operation	
LD10	Up-Down Motor Failure	Off = Normal Operation	On = Up-Down Motor Drive Failure
LD11	Left-Right Motor Failure	Off = Normal Operation	On = Left-Right Motor Drive Failure
LD12	Up-Down Motor Drive and Direction	On Red = Up Movement On Green = Down Movement	Off = No Drive Occurring
LD13	Forward-Back Motor Failure	Off = Normal Operation	On = Forward-Back Motor Drive Failure
LD14	Forward-Back Motor Drive and Direction	On Red = Backward Movement On Green = Forward Movement	Off = No Drive Occurring
LD15	Left-Right Motor Drive and Direction	On Red = Right Movement On Green = Left Movement	Off = No Drive Occurring
LD16	Solenoid Failure	Off = Normal Operation	On = Solenoid Over-current or Over-temperature
LD17	Solenoid Drive	On = Drive Occurring	Off = No Drive Occurring
LD18	Power Indicator	On = 32 VDC Power Present	Off = No 32 VDC Power
LD19	Rope Light 0	On = Drive Occurring	Off = No Drive Occurring
LD20	Rope Light 1	On = Drive Occurring	Off = No Drive Occurring
LD21	Rope Light 2	On = Drive Occurring	Off = No Drive Occurring
LD22	Rope Light 3	On = Drive Occurring	Off = No Drive Occurring

SECTION SIX:

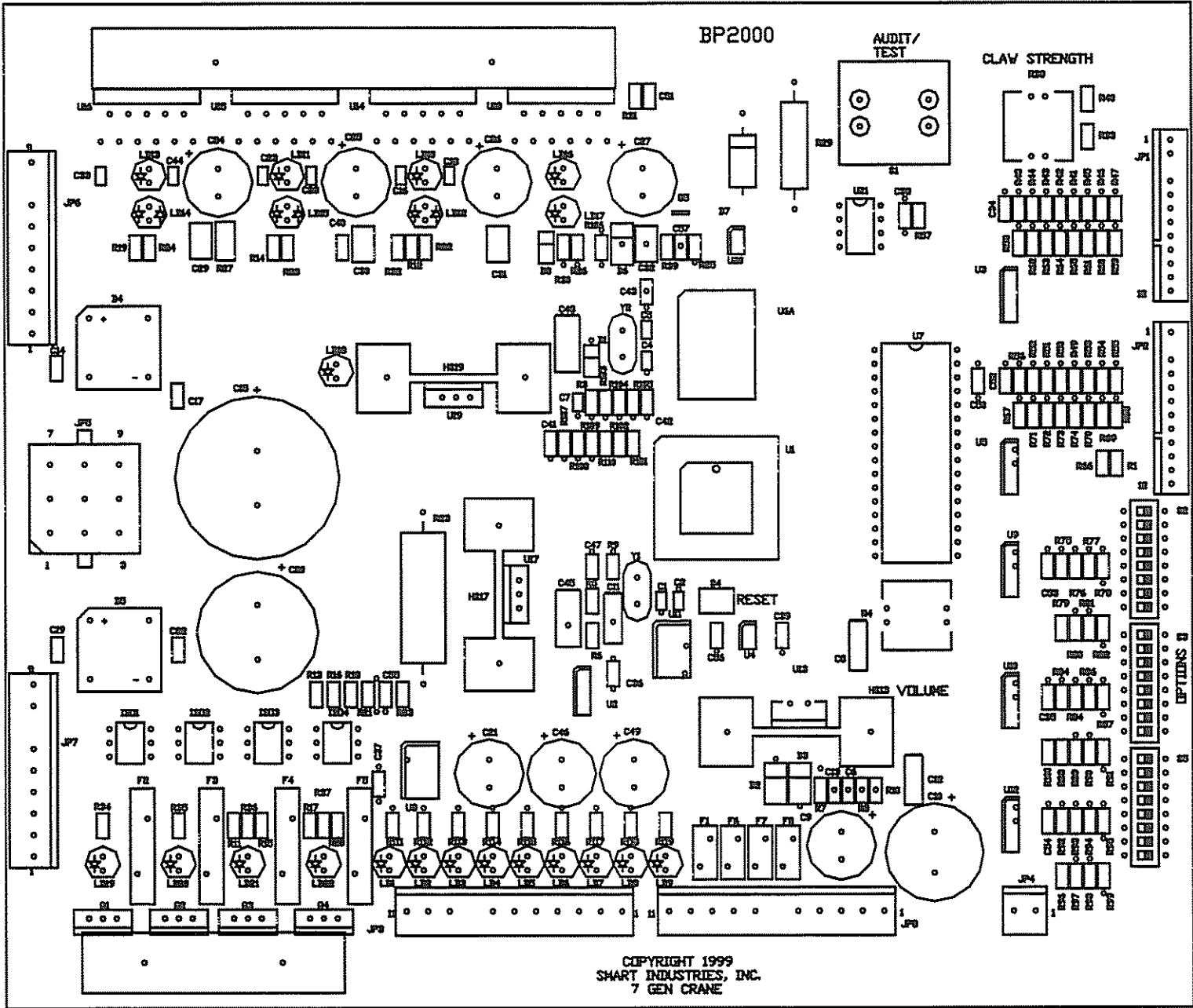
WIRING DIAGRAMS AND SCHEMATIC

7th GENERATION BOARD LAYOUT - THROUGH-HOLE DESIGN

BP2000

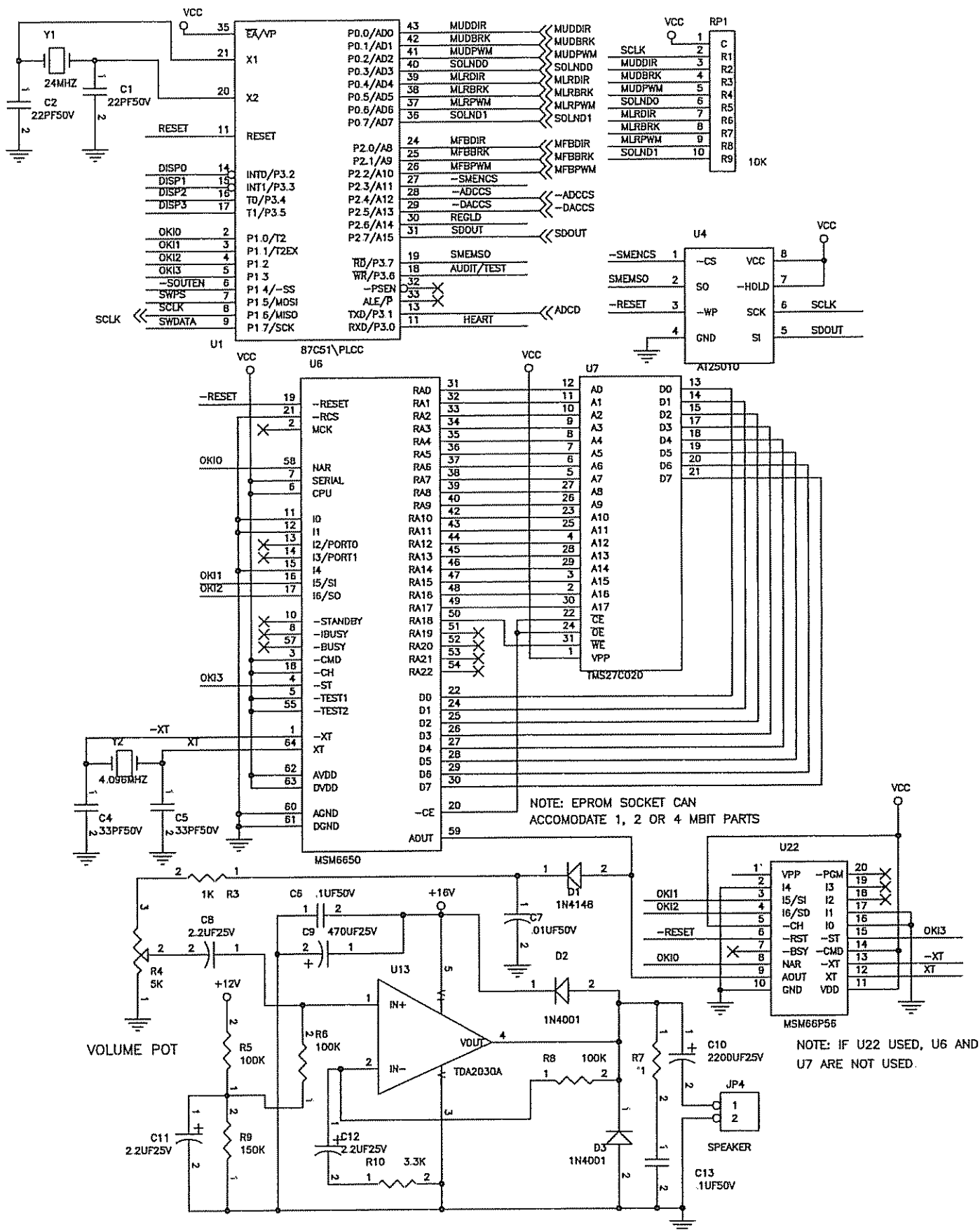


7th GENERATION BOARD LAYOUT - SURFACE MOUNT DESIGN

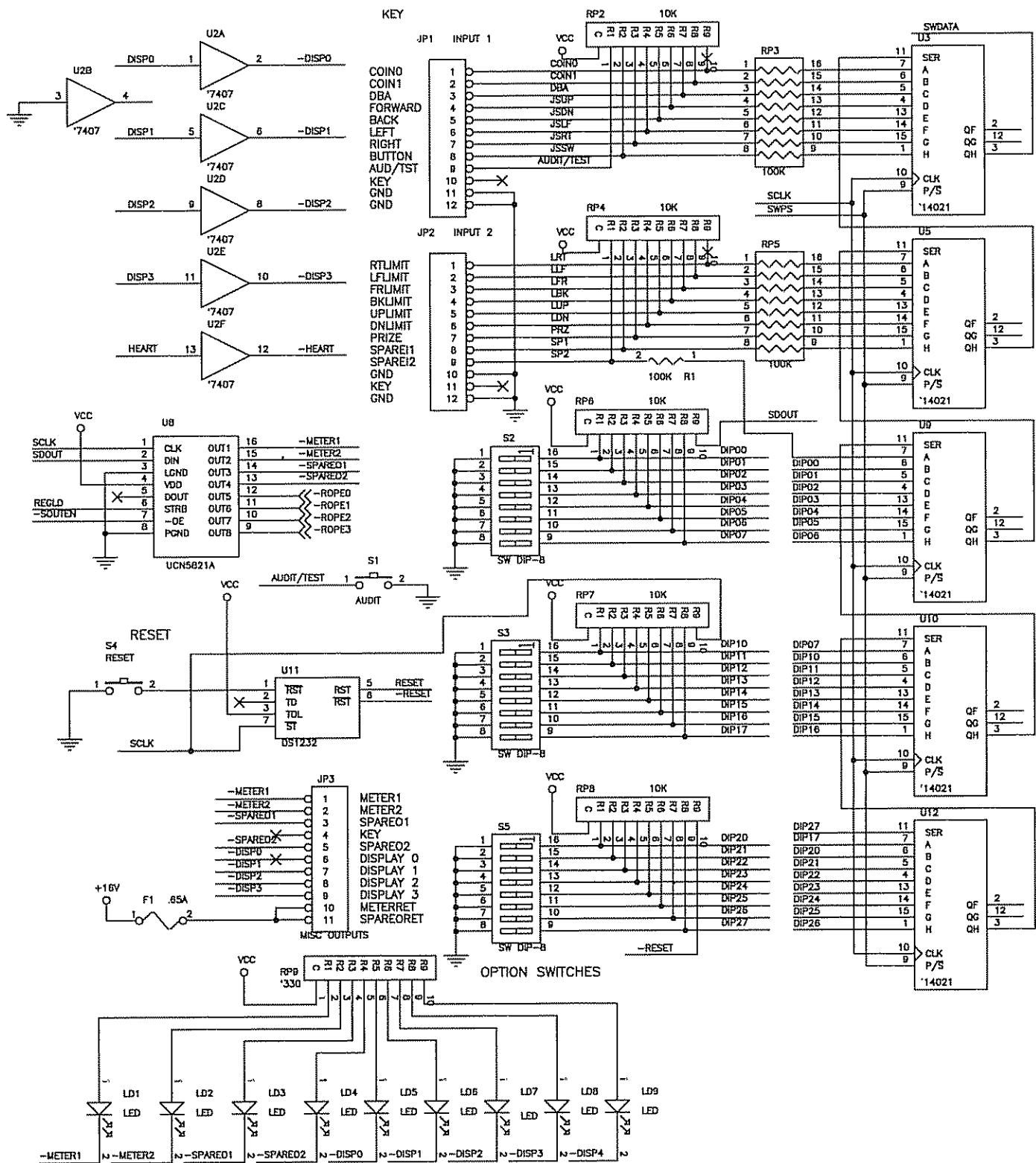


7th GENERATION BOARD SCHEMATIC

PART NO. 51329 1 OF 4

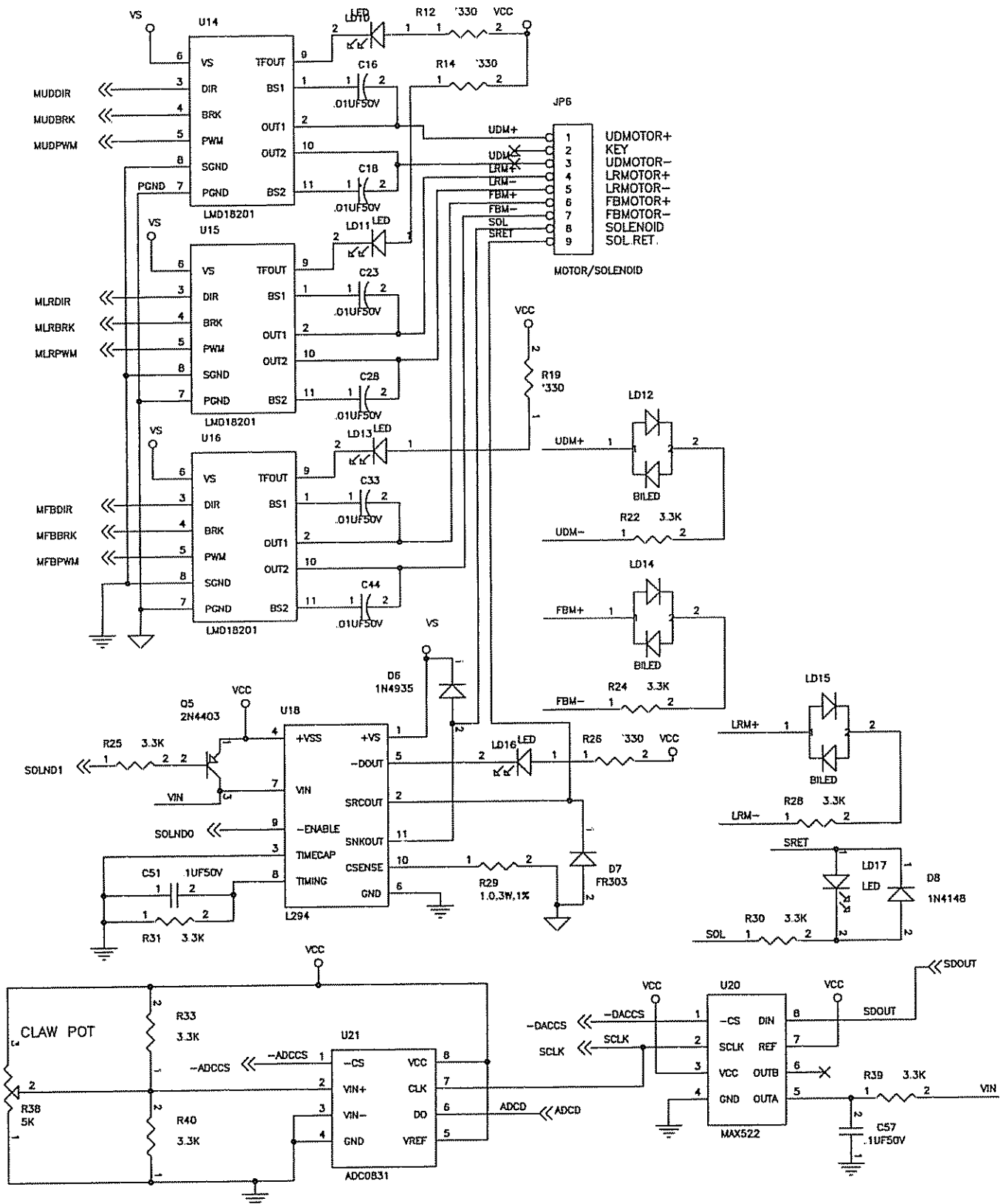


7th GENERATION BOARD SCHEMATIC
PART NO. 51329 2 OF 4



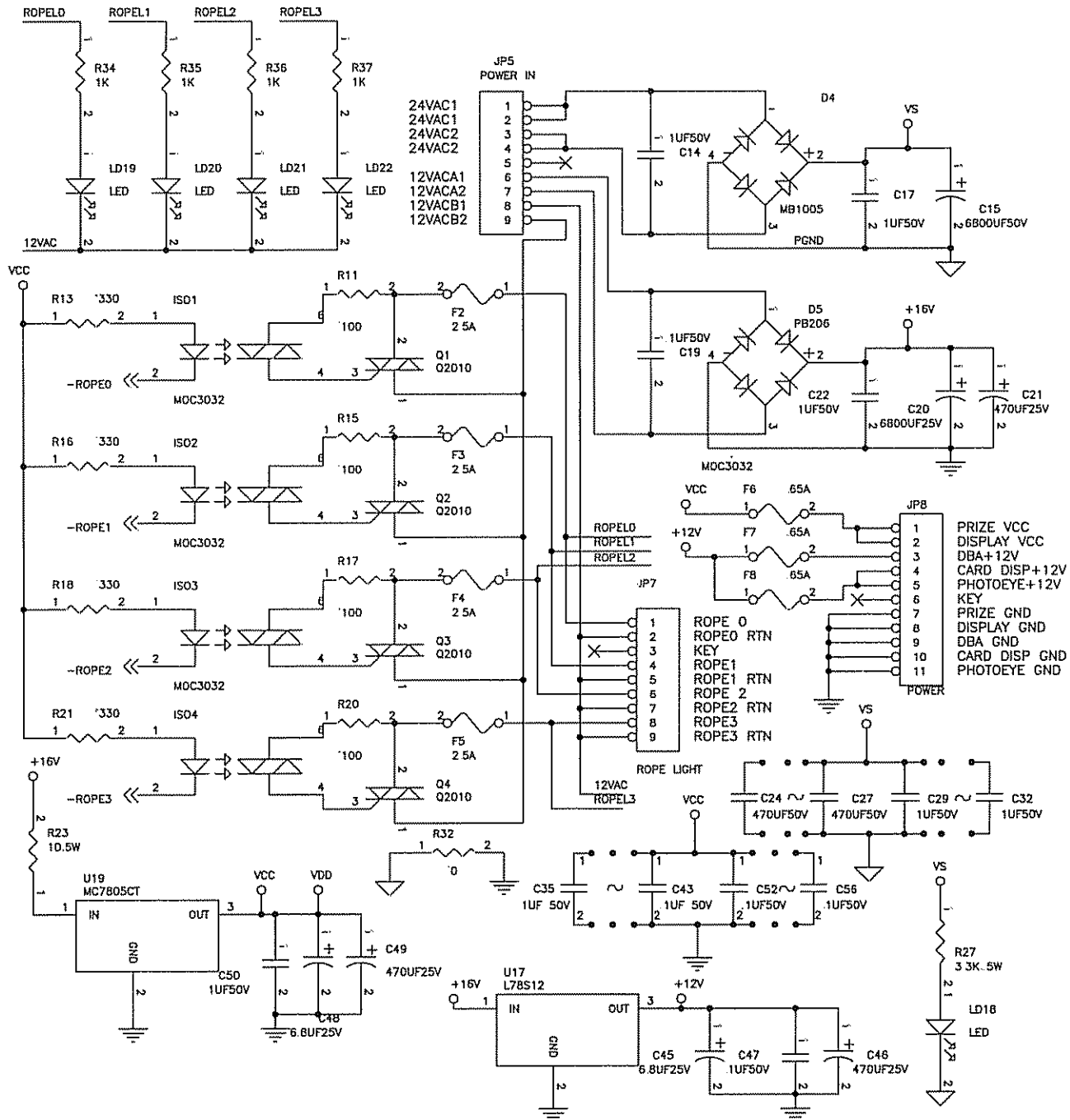
7th GENERATION BOARD SCHEMATIC

PART NO. 51329 3 OF 4



7th GENERATION BOARD SCHEMATIC

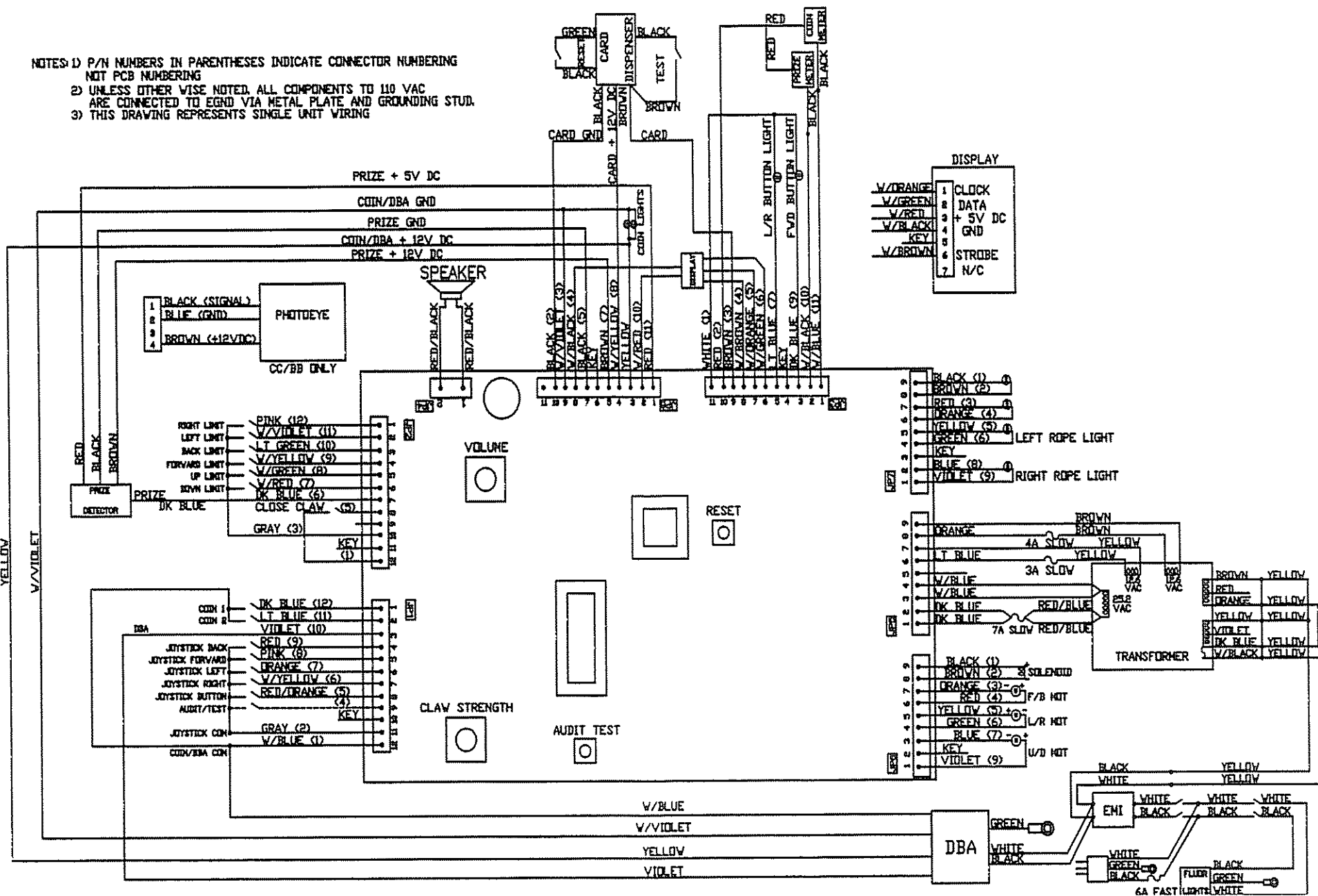
PART NO. 51329 4 OF 4



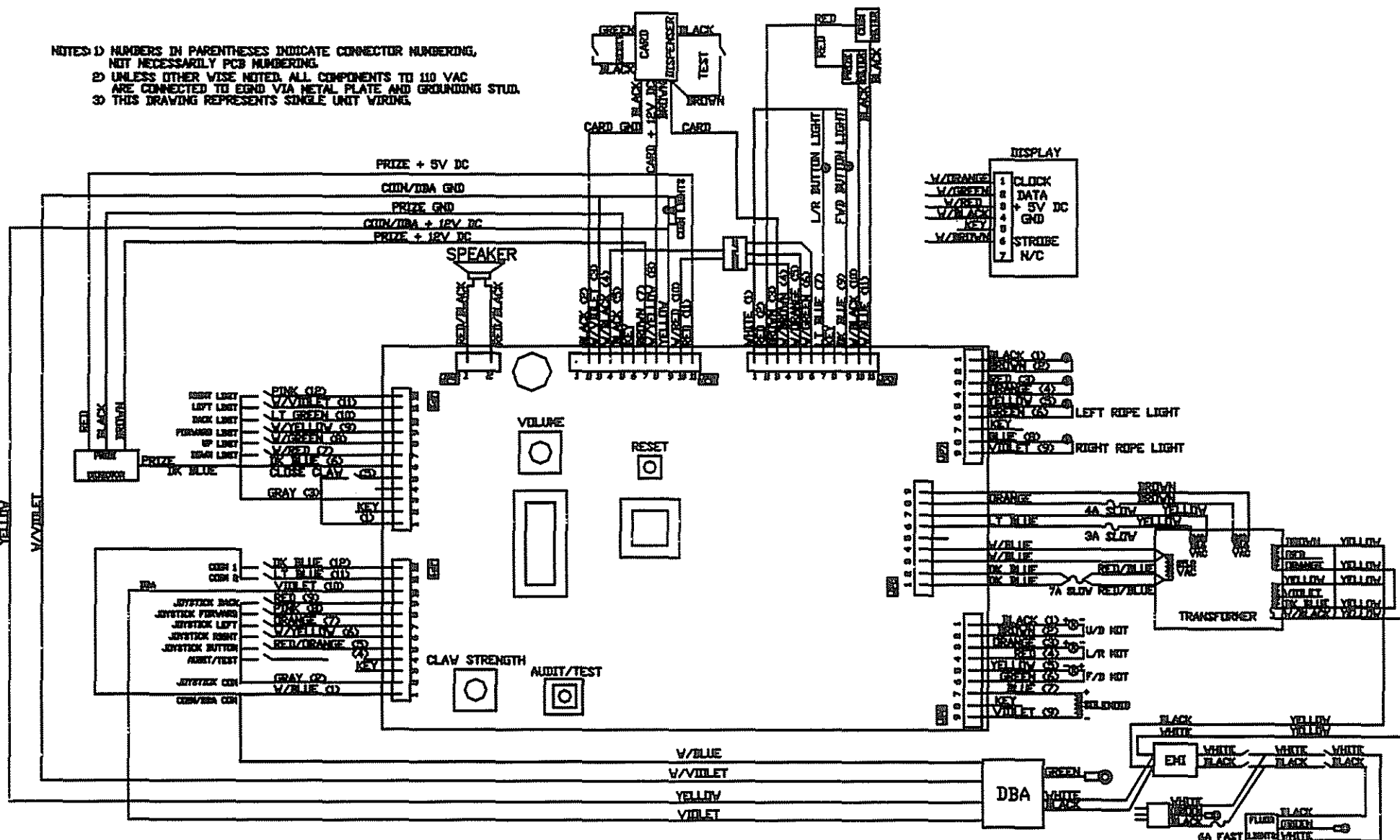
NOTES: 1) P/N NUMBERS IN PARENTHESES INDICATE CONNECTOR NUMBERING
NOT PCB NUMBERING

2) UNLESS OTHERWISE NOTED, ALL COMPONENTS TO 110 VAC
ARE CONNECTED TO EGMND VIA METAL PLATE AND GROUNDING STUD.

3) THIS DRAWING REPRESENTS SINGLE UNIT WIRING



7th GENERATION BLOCK WIRING DIAGRAM - THROUGH-HOLE VERSION



7th GENERATION

BLOCK WIRING DIAGRAM - SURFACE-MOUNT VERSION

BP2000 BOARD HARNESSING

- CONNECTOR/FUNCTION DESCRIPTIONS

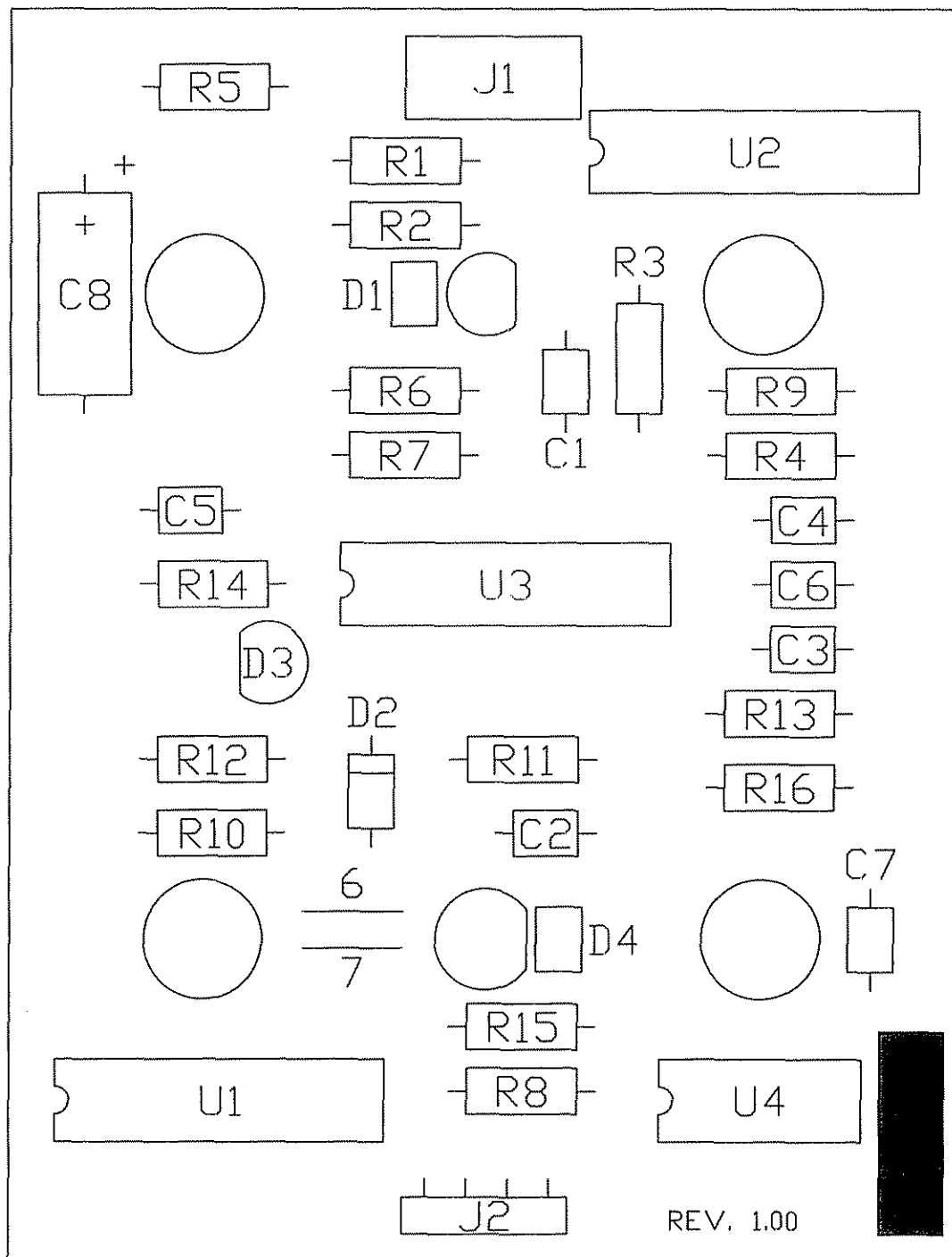
CONNECTOR	BOARD PIN NUMBER		HARNESS PIN NUMBER	HARNESS WIRE COLOR	FUNCTION
	THRU-HOLE VERSION	SURFACE MOUNT VERSION			
JP1	1	12	12	DARK BLUE	COIN 1 SWITCH
JP1	2	11	11	LIGHT BLUE	COIN 2 SWITCH
JP1	3	10	10	VIOLET	DBA INPUT
JP1	4	9	9	RED	JOYSTICK BACK SWITCH
JP1	5	8	8	PINK	JOYSTICK FORWARD SWITCH
JP1	6	7	7	ORANGE	JOYSTICK LEFT SWITCH
JP1	7	6	6	WHITE/YELLOW	JOYSTICK RIGHT SWITCH
JP1	8	5	5	RED/ORANGE	JOYSTICK BUTTON SWITCH
JP1	9	4	4	----	AUDIT/TEST BUTTON
JP1	10	3	3	KEY	KEY
JP1	11	2	2	GREY	JOYSTICK COMMON
JP1	12	1	1	WHITE/BLUE	COIN/DBA COMMON
JP2	1	12	12	PINK	RIGHT LIMIT SWITCH
JP2	2	11	11	WHITE/VIOLET	LEFT LIMIT SWITCH
JP2	3	10	10	LIGHT GREEN	BACK LIMIT SWITCH
JP2	4	9	9	WHITE/YELLOW	FRONT LIMIT SWITCH
JP2	5	8	8	WHITE/GREEN	UP LIMIT SWITCH
JP2	6	7	7	WHITE/RED	DOWN LIMIT SWITCH
JP2	7	6	6	DARK BLUE	PRIZE INPUT
JP2	8	5	5	TAN	CLOSE CLAW SWITCH
JP2	9	4	4	----	SPARE INPUT
JP2	10	3	3	GRAY	LIMIT SWITCH COMMON
JP2	11	2	2	KEY	KEY
JP2	12	1	1	BLACK	CLAW CLOSE COMMON
JP3	1	11	11	WHITE/BLUE	COIN METER OUT
JP3	2	10	10	WHITE/BLACK	PRIZE METER OUT
JP3	3	9	9	DARK BLUE	FORWARD BUTTON LIGHT OUT
JP3	4	8	8	KEY	KEY
JP3	5	7	7	LIGHT BLUE	LEFT/RIGHT BUTTON LIGHT OUT
JP3	6	6	6	WHITE/GREEN	DISPLAY DATA
JP3	7	5	5	WHITE/ORANGE	DISPLAY CLOCK
JP3	8	4	4	WHITE/BROWN	DISPLAY STROBE
JP3	9	3	3	BROWN	CARD DISPENSER OUT
JP3	10	2	2	RED	METER +16V
JP3	11	1	1	WHITE	BUTTON LIGHT +16V
JP4	1	2	2	RED/BLACK	SPEAKER 1
JP4	2	1	1	RED/BLACK	SPEAKER 2

BP2000 BOARD HARNESSING

- CONNECTOR/FUNCTION DESCRIPTIONS - (CONTINUED)

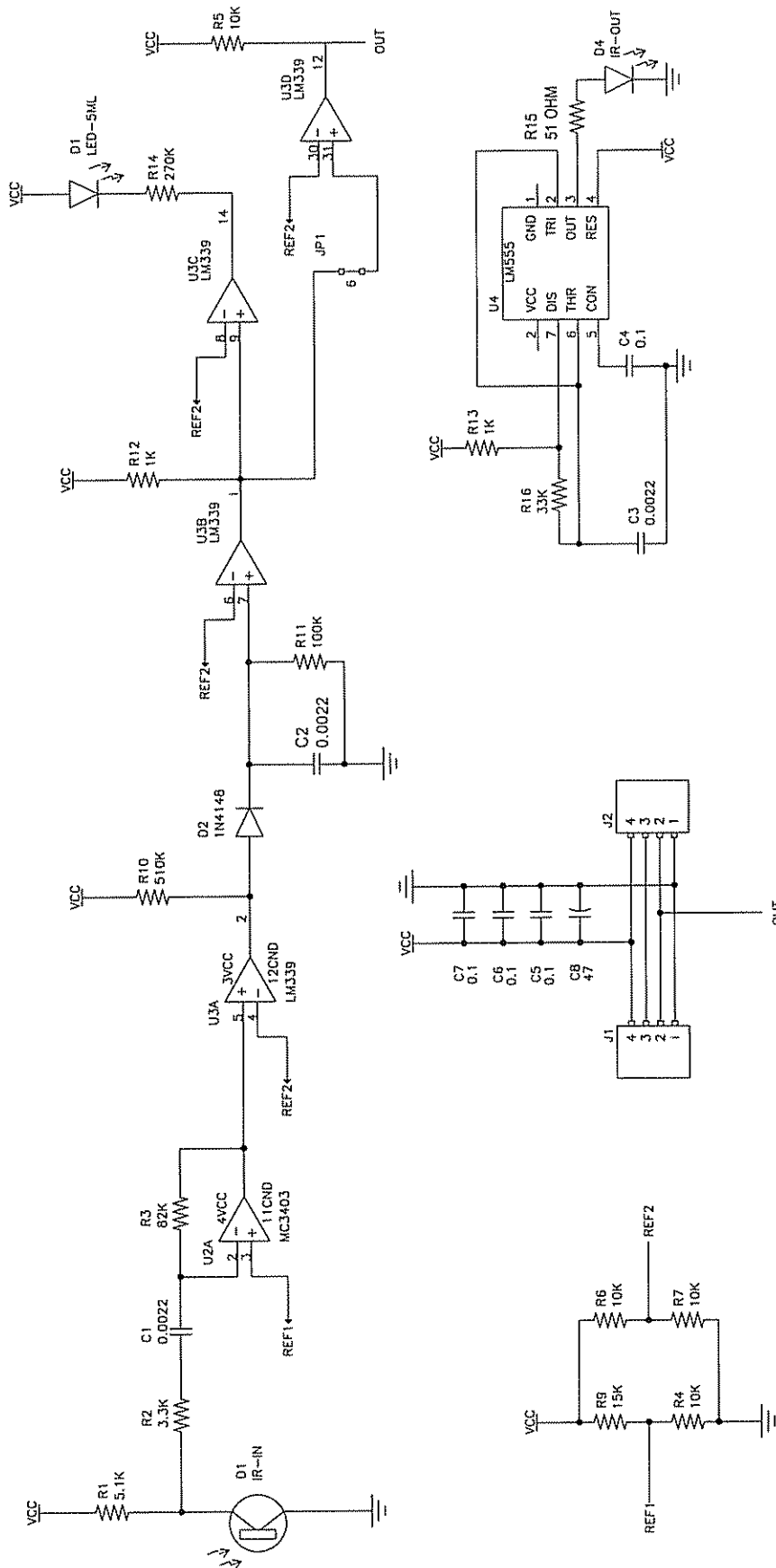
CONNECTOR	BOARD PIN NUMBER		HARNESS PIN NUMBER	HARNESS WIRE COLOR	FUNCTION
	THRU-HOLE VERSION	SURFACE MOUNT VERSION			
JP5	1	1	1	DARK BLUE	25VAC1
JP5	2	2	2	DARK BLUE	25VAC1
JP5	3	3	3	WHITE/BLUE	12VAC2
JP5	4	4	4	WHITE/BLUE	12VAC2
JP5	5	5	5	----	(EMPTY)
JP5	6	6	6	LIGHT BLUE	12VACA1
JP5	7	7	7	YELLOW	12VACA2
JP5	8	8	8	ORANGE	12VACB1
JP5	9	9	9	BROWN	12VACB2
JP6	1	9	9	VIOLET	UP/DOWN MOTOR +
JP6	2	8	8	KEY	KEY
JP6	3	7	7	BLUE	UP/DOWN MOTOR -
JP6	4	6	6	GREEN	LEFT/RIGHT MOTOR -
JP6	5	5	5	YELLOW	LEFT/RIGHT MOTOR +
JP6	6	4	4	RED	FORWARD/BACK MOTOR -
JP6	7	3	3	ORANGE	FORWARD/BACK MOTOR +
JP6	8	2	2	BROWN	SOLENOID +
JP6	9	1	1	BLACK	SOLENOID -
JP7	1	9	9	VIOLET	ROPE LIGHT 0
JP7	2	8	8	BLUE	ROPE LIGHT 0 COMMON
JP7	3	7	7	KEY	KEY
JP7	4	6	6	GREEN	ROPE LIGHT 1
JP7	5	5	5	YELLOW	ROPE LIGHT 1 COMMON
JP7	6	4	4	ORANGE	ROPE LIGHT 2
JP7	7	3	3	RED	ROPE LIGHT 2 COMMON
JP7	8	2	2	BROWN	ROPE LIGHT 3
JP7	9	1	1	BLACK	ROPE LIGHT 3 COMMON
JP8	1	11	11	RED	PRIZE DETECTOR Vcc
JP8	2	10	10	WHITE/RED	DISPLAY Vcc
JP8	3	9	9	YELLOW	COIN/DBA +12VDC
JP8	4	8	8	WHITE/YELLOW	CARD DISPENSER +12VDC
JP8	5	7	7	BROWN	PHOTOEYE +12VDC
JP8	6	6	6	KEY	KEY
JP8	7	5	5	BLACK	PRIZE DETECTOR GROUND
JP8	8	4	4	WHITE/BLACK	DISPLAY GROUND
JP8	9	3	3	WHITE/VIOLET	COIN/DBA GROUND
JP8	10	2	2	BLACK	CARD DISPENSER GROUND
JP8	11	1	1	----	PHOTOEYE GROUND

PRIZE DETECTOR BOARD LAYOUT - SEPARATE BOARDS / THROUGH-HOLE DESIGN



PRIZE DETECTOR BOARD SCHEMATIC

- SEPARATE BOARDS / THROUGH-HOLE DESIGN

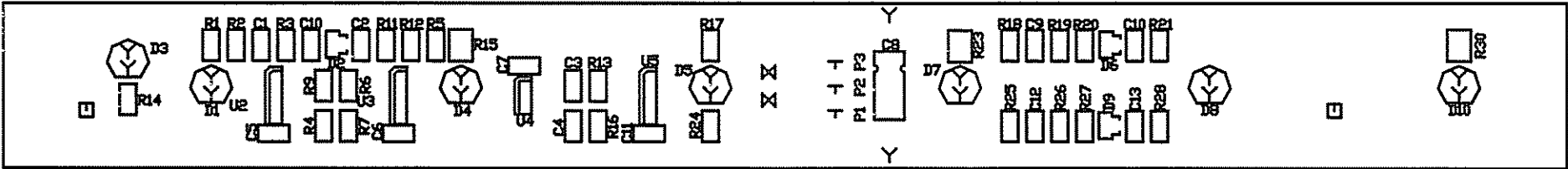


PRIZE DETECTOR PARTS LIST

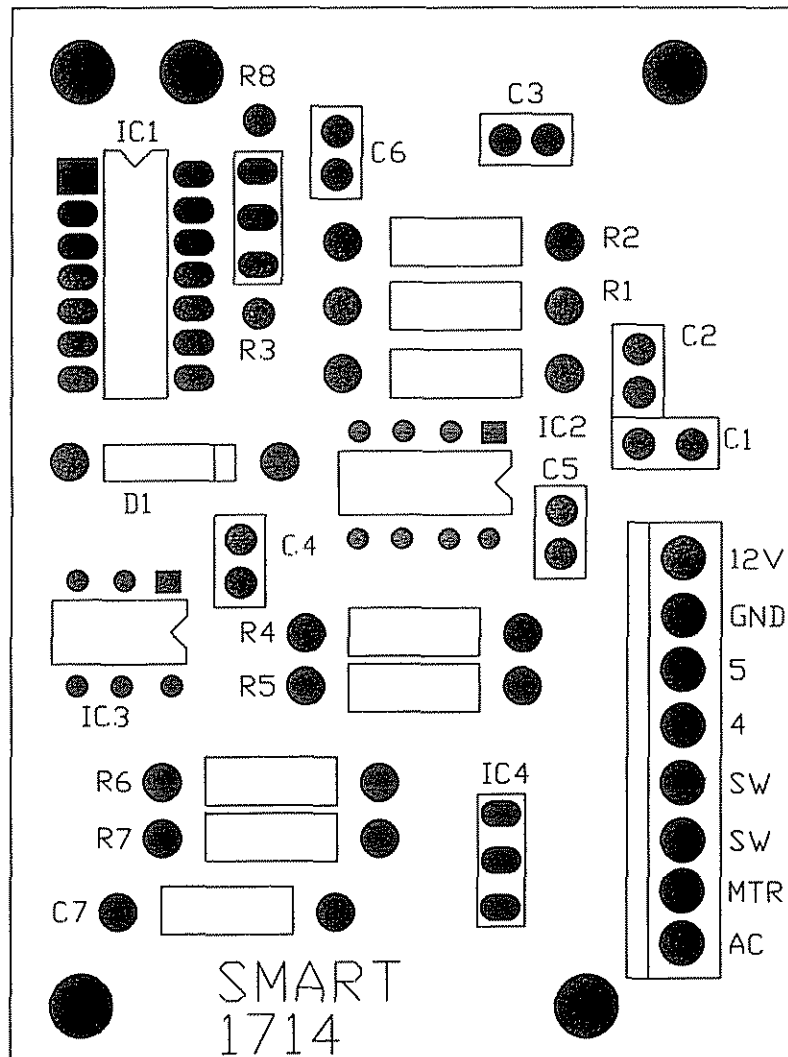
- SEPARATE BOARDS / THROUGH-HOLE DESIGN

<u>SYMBOL</u>	<u>COMPONENT</u>	<u>DESCRIPTION</u>
U1	IC	NOT USED
U2	IC	MC3403 Quad Operational Amplifier
U3	IC	LM339 Quad Comparator
U4	IC	NE555 Timer
D1	DIODE	IR Photo Diode Detector w/socket
D2	DIODE	1N4148
D3	DIODE	LED w/socket
D4	DIODE	IR Photo Diode Emitter w/socket
C1, C2, C3	CAPACITOR	.0022 μ F Ceramic
C4,C5,C6,C7	CAPACITOR	1 μ F Ceramic
C8	CAPACITOR	47 μ F 16V Electrolytic
R1	RESISTOR	5.1k Ω 1/4W 5% Tolerance Carbon
R2	RESISTOR	3.3k Ω 1/4W 5% Tolerance Carbon
R3	RESISTOR	82k Ω 1/4W 5% Tolerance Carbon
R4,R5,R6,R7	RESISTOR	10k Ω 1/4W 5% Tolerance Carbon
R8	RESISTOR	NOT USED
R9	RESISTOR	15k Ω 1/4W 5% Tolerance Carbon
R10	RESISTOR	510 Ω 1/4W 5% Tolerance Carbon
R11	RESISTOR	100k Ω 1/4W 5% Tolerance Carbon
R12, R13	RESISTOR	1k Ω 1/4W 5% Tolerance Carbon
R14	RESISTOR	270 Ω 1/4W 5% Tolerance Carbon
R15	RESISTOR	51 Ω 1/4W 5% Tolerance Carbon
R16	RESISTOR	33k Ω 1/4W 5% Tolerance Carbon
J1	CONNECTOR	4455 Side Entry Type a Right Angle 100CL .025SQ PCB Connector
J2	CONNECTOR	7478 Right Angle Friction Lock .100CL .025SQ PCB Header
6	JUMPER	

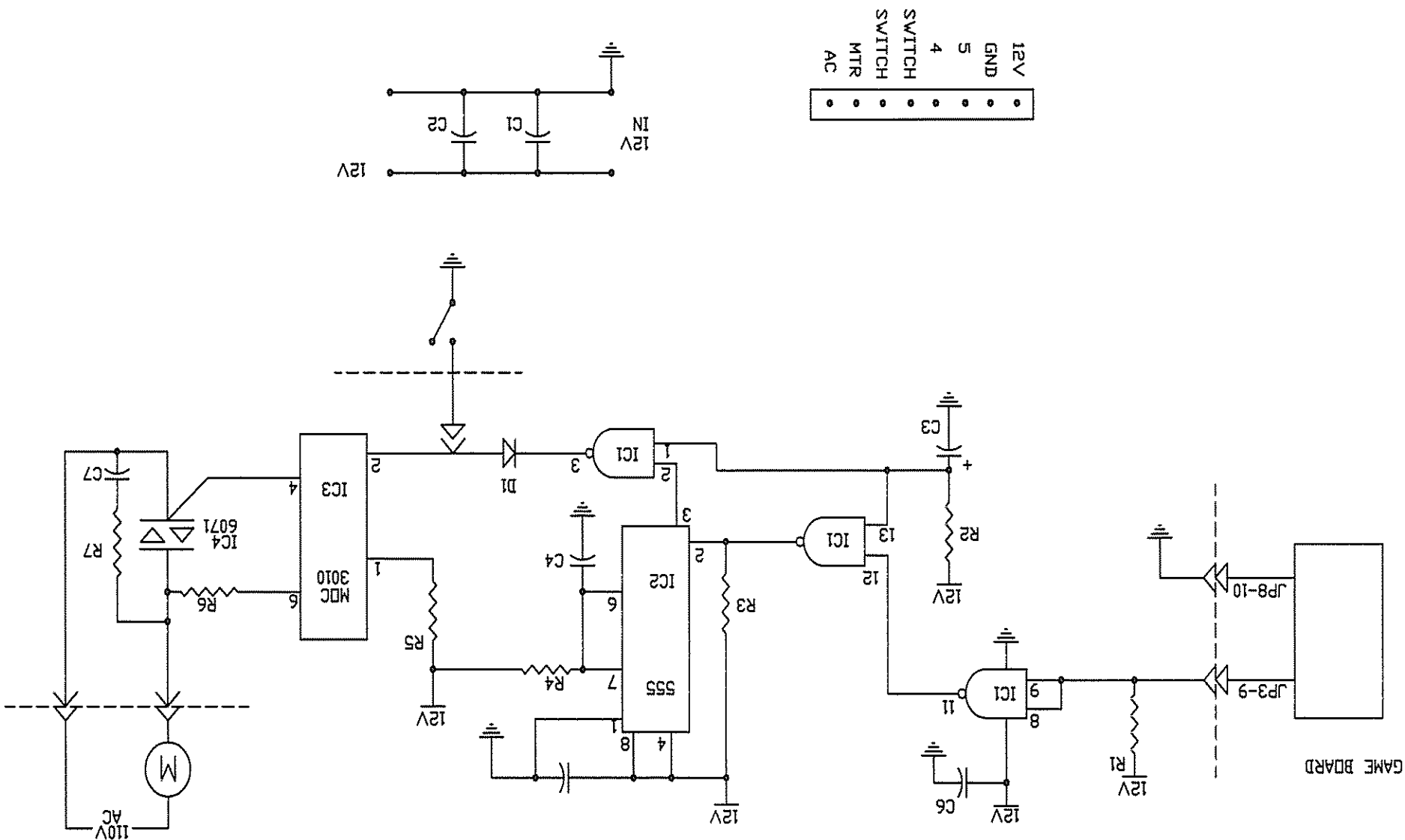
**PRIZE DETECTION ASSEMBLY BOARD LAYOUT
- 3-IN-1 SURFACE MOUNT DESIGN
(PBC ASSEMBLY OF PART NO. 14729)**



BULK VENDOR / GUMBALL DISPENSER DRIVER BOARD LAYOUT



BULK VENDOR / GUMBALL DISPENSER DRIVER BOARD SCHEMATIC



BULK VENDOR / GUM BALL DISPENSER DRIVER BOARD PARTS LIST

<u>SYMBOL</u>	<u>COMPONENT</u>	<u>DESCRIPTION</u>
C1	CAPACITOR	22-uF 16V tantalum
C2	CAPACITOR	.1-uF 50V ceramic disc .200 lead spacing
C3, C4	CAPACITOR	10-uF 16V tantalum
C5, C6	CAPACITOR	.1-uF 50V ceramic disc 100 lead spacing
C7	CAPACITOR	.1-uF 630V polyester .600 lead spacing
R1, R5	RESISTOR	1.0-kohm 1/4 W 5% tolerance
R2	RESISTOR	220-kohm 1/4 W 5% tolerance
R3	RESISTOR	4.7-kohm 1/4 W 5% tolerance
R4	RESISTOR	100-kohm 1/4 W 5% tolerance
R6	RESISTOR	390 ohm 1/4 W 5% tolerance
R7	RESISTOR	100-ohm 1/2 W 5% tolerance
R8	RESISTOR	0 ohm, use 22 Ga wire jumper
IC1	IC	MC14093 Quad 2-Input NAND
IC2	IC	NE555 Timer
IC3	IC	MOC3010 Optoisolator
IC4	TRIAC	2N6071 4A 200V
D1	DIODE	1N914 or 1N4148
P1	CONNECTOR	8-Pin KK, .156 spacing